THE INTERNATIONAL ANNUAL

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PREFACE

The eighth volume of the International Annual will, I think, appeal to all lovers of photography. As with the previous volumes, it owes its existence to the many photographic workers who have placed on record their thoughts regarding the many details of our wonderful art-science. To all who have so kindly helped in the compilation of this work my most earnest thanks are due and tendered.

The air is now full of rumors regarding color-photography and it may be that before the issuance of another volume some practical method of reproducing the colors of nature, and so realizing the dreams of early workers, will be in the hands of our readers. Such a consummation of the efforts of photographic investigators is to be earnestly hoped for.

FREDERICK J. HARRISON

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Anthony's Photographic Bulletin.

1896.

PICTORIAL POSSIBILITIES.

By Peter Eland, Bradford, Eng.

WHY do you weep, Mr. Mahoganytype? Why is your hair rumpled, and why do the traces of bitterness and despair hang around the corners of your mouth? What great sorrow has come upon you? What is that you say? Ah, that explains it all! You have been trying to photograph a lad of fifteen so as the result might not be an outrage on your artistic feelings, and you have failed miserably. Let us look at the picture. I' faith! it is indeed a ghastly production. To the general run of photographers such a youth would seem utterly destitute of the artistic element. That billy-cock alone is sufficient to drive one to use language of an unparliamentary character, and those pants "sit on" the pictorial. His attitude is marvelously unlike that which he would assume in every-day life, and it is evident he feels that he is having his picture taken. Put it away. Mr. Mahoganytype, you will never make a picture from him while he has on his Sunday clothes and is surrounded by the accessories of the studio. When that thing goes home his mother will wail and say that it is not the slightest bit like their John. Why is it not like their John? It is not like their

John because it is artificial. And how are we to get over the difficulty? How can we make this youth, who is not ragged or dirty enough to be what is commonly accepted as picturesque, artistic? The means are very simple. In the first place, a background whereon is a design is out of the question, and so are accessories. A cloth of the plain white continuous kind is what we want. It will show the figure out and not detract from it. I said accessories were out of the question, but that was perhaps a little too strong. We must get a few posts made up in the shape of a common garden fence, and we must get a bucket and a wooden pail. These materials will enable us to evolve numberless poses.

And now comes the task of making John pictorial. He will never make a picture in his Sunday garments. Ask him to come in his every-day clothes. They need not be so very old so long as they have got the creases in them which are so distinctive in different figures. And now let us set about the business by asking John to take off his coat, as shirt sleeves are a hundred times more effective. Ask John to climb on that fence and sit on it naturally. There, the result is many times superior than if the stereotyped studio attitude had been assumed. But there are endless other poses which will produce equally good things. For instance, it would not perhaps be lowering John's dignity too much to ask him to sit on the bucket and clean boots. He looks more lifelike cleaning boots than he does grasping a volume of Longfellow's poems. Then, again, he might sit on the bucket easily, just as he would sit on a common every-day bucket, and not with the Sabbath-like air which he would assume if requested to recline on an elegantly upholstered studio chair. Then he might stand at ease with

his hands in his pockets and examine the construction of his boots, and after that he could get tired and hold up his hands behind his head, as is the manner of those engaged in a long stretch. Then he could put on his jacket and walk away reading, and if that were not satisfactory he could lie comfortably on the floor and read there.

What are the results? Pictures, pictures and portraits at the same time. It is hardly possible to believe that this is the same youth who wore the billycock and those trowsers, but it is a downright fact all the same. What has relieved this boy from the commonplace? Nothing at all but a very little art and a good deal of nature. The reason of the utter failure of the first photograph was that John felt that he was not at home. The reason of the success of the latter series lies in the fact that he was in his every-day clothes, living his every-day life.

Mr. Mahoganytype, there are a hundred such Johns scattered up and down the country who are the bane of the photographer, simply because he does not know how to utilize the material at hand. In almost every case the surroundings are the chief fault. As I told you before, it is useless to try to introduce a background of the ordinary type. Chairs, too, and rich velvet curtains and palm leaves should be cast aside. They may be suitable indeed for ladies and little children, but they are out of it where a lad in the hobbledehoy stage of existence is in question. He does not hang out amid such surroundings. He is more comfortable in the schoolroom or the field or the office. Employ, therefore, simply a plain background and but a few accessories of the class named. Insist upon having clothes

which have been in use and which have not been laid away in lavender. Study the difficult problem of easy posing. Judge what each sitter would be likely to do when he is away from the camera and arrange him accordingly. Don't give a studious youth a football to hold, and don't let the athletic young man read poetry. Acquire the art of suiting your conversation to your model, and thus bring out the natural expression.

Attend to these points, my dear Mahoganytype, and you will produce something more than mere portraits. If you allow Nature to have it all her own way she will make you a picture even from an office-boy.

Note.—All the photographs illustrating this article were made from the same model in the course of a few days. The boy was not picked on account of his possessing any special pictorial value save a decent figure. These pictures were taken in the open air, but I have since fitted up a background, as suggested, in my studio and find it answers admirably.

WHY IS IT?

By H. M. Beeles, Great Valley, N. Y.

THAT in all the photographic journals and annuals there are to be found contradictions, i. e., one author makes a statement and another makes a contrary one. For example: A tells you he finds Eiko, or Eiko and Hydrokinone, the developer *par excellence;* B declares he has tried that to his entire satisfaction and finds Metol far ahead in all respects; C thinks all should adopt Reducin; D knows Amidol is

best; E says Rodinal is good enough for him, and F declares Pyro is still at the head and is bound to stay there, &c., &c. Now, each of these, without a doubt, is trying to give his brothers in the art-science honest and conscientious advice; but, no doubt, the truth is that each of these has been fortunate with his favorite and unfortunate with the others. To illustrate, I have for over two years used Rodinal with uniformly good results, such as I never obtained by other means; still, others obtain as good results with other developers. Why is it? And one believes his favorite must be the best, notwithstanding the exquisite results produced by others with other formulæ, and he must needs give his opinion positive assertion in print. Why is it?

Again, a photographer has found himself in dire need of some dish or accessory, but minus cash, and he, like the brave fellow he was, turned mechanic and produced for himself a good serviceable article, and being full of sympathy for such of his unfortunate fellows as might be caught in similar dilemma, noted down what he had done and sent it to his favorite journal or annual; and some other fellow, with plenty of stamps and a business that did not require him to use like economy, at once wrote a sarcastic article, pooh-poohing all home-made articles, and especially the fellows who write such things. Why is it?

One describes his method of lighting, or posing, or tells us what success he has with certain plates or paper, or with some process, and another thinks something different better. Why is it?

The question has been repeated often enough. The answer is, there is not yet enough brotherly charity among us, or I might better state it by saying we are not yet rid of all the cranks.

I think each article contributed, no matter how contrary in spirit to some other article, has benefited some one. The photographer of ye olden time who by mischance spilled part of his negative bath when on a viewing excursion, overcame the difficulty by putting clean sheets of glass into the bath-holder until the solution covered his plate, and in the exuberance of his joy sent the news to the journal, was a decided help to his like unfortunate co-laborer who may not have been as thoughtful. Since all photographic literature is founded on individual experiments and experiences, and the results of experiments and experiences are various, we need not expect uniform testimony from those who write; yet it is safe to hazard the opinion that nearly all of those who do write do not desire to invite sarcasm or adverse criticism.

One of my friends tells me a portrait lens is best for studio work, and another says a R. R. lens is best. The first makes nearly all single figures, busts, half-lengths, etc.; the other makes many groups or standing figures. Are not both, in a sense, right? Is it necessary to ridicule any one whose experience differs from ours? Can we not, if we differ, modestly express our difference? And does any one suppose that any makeshift of a tray or a sink or screen or even a background will seriously interfere with the business of the stock-dealer? In the end the experimenter finds he cannot compete to his own financial advantage with either the skilled mechanic or the stock-dealer, and proceeds to buy what he needs because they are more useful, substantial and artistic.

STEREOSCOPIC PHOTOGRAPHY.

By W. A. Hyslop, Edinburgh, Scotland.

NOW that the revival of this, the most beautiful and realistic of any kind of photograph, has taken place, or is taking place, a few observations derived from practical experience may be of interest and assistance. Now first a note of warning—if stereo-photography has come to stay, the work done must be good, and a great improvement on the cheap collotype slides one usually sees for sale. There is no complaint now, as in the past, regarding the stereoscope itself, though a more general manufacture of instruments having a method of separating the eye-pieces would be an improvement, and also the use of eye-pieces of shorter focus, say about 5 inches, as one then obtains a much more realistic appearance. Glass transparencies are undoubtedly the most perfect, and after them, highly glazed prints on collodion or gelatine paper. To produce slides by either of these processes, a much increased price must be asked; but surely if a thing is worth doing at all, do it well should be the axiom, and one perfect transparency or half a dozen really good prints are worth far more than a score of those produced and sold at 2d. each.

As regards the optical principle involved, it is needless to speak here. Single landscape lenses, accurately paired, of about 5-inch focus, working at f11, and with a separation of about $3\frac{1}{8}$ inches, and a good shutter for time and instantaneous exposures, will gen-

erally be found the most useful. The camera should have a rising and falling front, and, if an ordinary half-plate is used, a division inside, than which nothing can be better than the roller blind of M. Chadwick of Manchester. The first and most important point after accurate focusing is to be liberal in your exposure, as thin negatives full of detail are what is wanted. It is not to be inferred from this that instantaneous work is to be avoided, but in such work have a good light, and give as lengthy an exposure as the subject will allow without showing motion. In selecting views the foreground must be carefully studied, as this forms the keynote to the whole. Avoid photographing immedidiately after a shower of rain or in bright sunlight, and you will thus to a great extent minimize the snowy effect only too common in stereo-slides, and which is perhaps one of the greatest difficulties to entirely avoid.

In development endeavor to bring out all the details without having too great density in any part. We now come to the printing and will first consider paper prints. They should be if anything over-printed; and if there be much white, sunning down or degradation of the whites is advisable in order to avoid snowy effects. In mounting, care must be taken to transpose the two halves (the right-hand print being mounted on the left half of the card), to have each half of equal size, with an identical base line, and above all not to exceed 3 inches from the principal foreground subject in the one print to the same subject in the other.

Now a word as to transparencies. The most usual practice is to use transparency plates $6\frac{1}{2}$x$3\frac{1}{4}$, and a special printing frame in which by moving the negative and transparency plate across each other, each half of the negative can be transposed; but a simpler way is to use two ordinary lantern slides ($3\frac{1}{4}$ inches square), observing in each case not to print say about $\frac{1}{4}$ of an inch of the sides of the

negative which will ultimately when transposed come together in the center of the finished slide, as otherwise your centers would exceed 3 inches. The transparencies should be made considerably denser than lantern slides are; indeed a little veiling is no drawback. The two lantern slides when finished can then be placed on one piece of glass $6\frac{1}{2}$x$3\frac{1}{4}$ and bound round in the usual way, and your transparency is complete. If desired, the two lantern slides can be coated (film side) with matt varnish before mounting, and of course masks with suitable openings used. Probably little that is new is here adduced, but new facts cannot always be propounded, and what is most elementary and well known to one may be new to another. Finally let me urge upon all the practice of stereo-photography for the following reasons: (1) It is perhaps the most beautiful of any photograph. (2) Either half is suitable to print as a lantern slide or for enlargement, and, lastly, by removing the division and using a single lens you can take ordinary half-plate photographs.

COLLODION OR GELATINE.

By Francis G. Eliot, Norbiton, England.

ANYONE who has lived since the days when photography first became a professional business must have seen and noted the vicissitudes that great processes have gone through; and it is a singular fact that generally when a process has arrived at its greatest perfection it has had to succumb to a new and superior one. First the Daguerreotype had just got to a stage when it seemed impossible to improve it further, when it had to give way to the then superior and more rapid progress of taking negatives on glass with collodion, which could produce endless copies on paper. Again, when the taking of negatives with collodion had so vastly improved as to be almost perfection, it had to give way to the much more convenient process of plates ready prepared, keeping both before and after exposure, by means of emulsions in gelatine.

Now in the printing copies from the negatives, although various useful and valuable processes have been brought before photographers, not one of them has been able to drive the old albumenized

FROM NATURE.

IN THE GLOAMIN' I' THE WOOD
THE THROSSIL WHUS'L'D SWEET.

PHUSOCHROME BY MACFARLANE ANDERSON,
FUSO COLOR CO., NORTHPORT, WASHINGTON.

paper entirely from the market. There is no doubt that nothing can exceed the beauty of a freshly printed and well toned proof on albumen paper, but it has long been condemned for its uncertainty of keeping its beauty of tone as perfect as when newly executed. Gelatine was hailed as a great improvement, and it was thought that the days of albumen were at last numbered; but finding some difficulty in the separate toning and fixing, which I believe is entirely due to the paper not being freshly made, or being kept too long in stock before being used, the toning and fixing in one bath was adopted, and the consequence is that the prints are more unstable than even albumenized ones. I have lately put in practice a method of toning gelatine prints which, if the paper is quite freshly prepared, is both simple and gives beautiful results. It is as follows: Soak the prints in one water, which save, then transfer them to another dish of water, pour off and pour over them a solution of alum, 1 oz. to 40; let them soak ten minutes, pour off and wash several times; lastly put them back into water No. 1 containing the silver first washed from them; after soaking a few minutes, drain and place in the ordinary acetate bath as used for albumen, which may be heated to 80° F. without any fear of injury, and they will tone as easily as albumenized prints. I have no doubt either a borax or phosphate bath would answer equally as well.

Gelatine however is, I believe from all I hear, likely to succumb to collodion. It will be a singular event should collodion, which has had to give way to gelatine for negatives, take its revenge by displacing gelatine from the printing. At present, English make of collodion paper is rather higher in price than gelatine, but there is a German make in the market called Formstecher's Collodio-Chloride paper, being sold at 16s. per quire, which will make it seriously compete with gelatine. The advantages of the collodion paper are its good keeping quality, ease in toning, and perfect freedom from any silver being left in the whites of the print to degrade the beauty of the finished result. It has been pronounced to be the printing process of the future.

"THUNDERBOLT" PHOTOGRAPHY.

By W. N. Jennings, Philadelphia.

IN 1876 the late Gaston Plante called attention to a new form of lightning which he had observed during a thunderstorm from a point on the outskirts of Paris. "A vast mist darkened the sky, which gave birth to

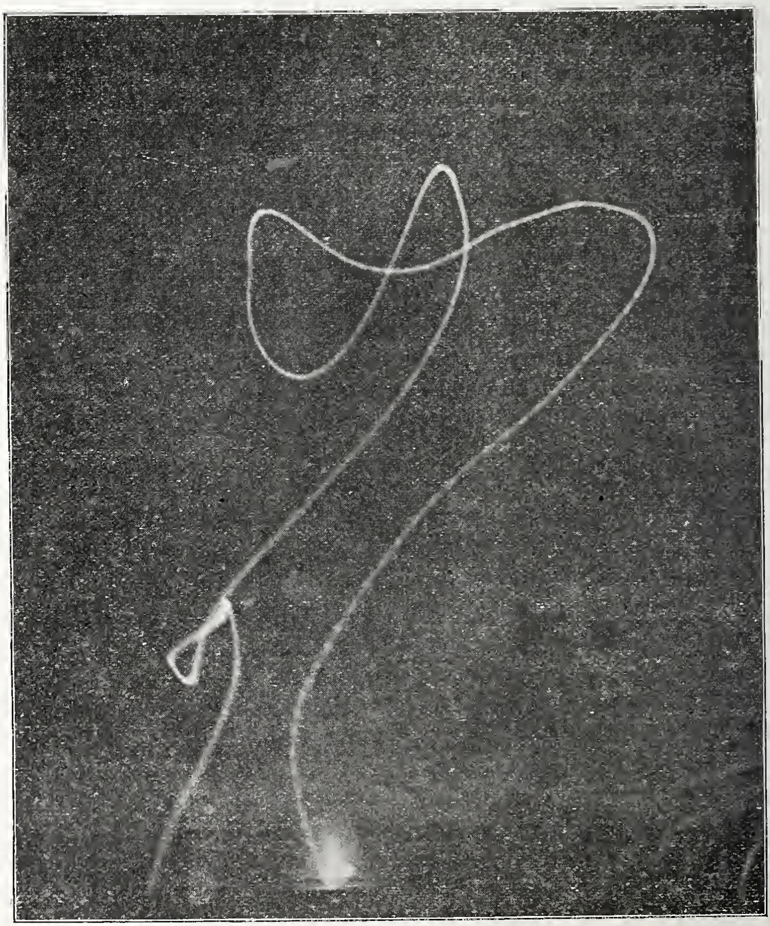


Photo. by W. N. Jennings.

a series of lightning discharges of great length and of varied forms; one of these bent on itself and formed a figure 8. These dis-

charges seemed to be composed of brilliant points." This M. Plante named "rosary," or beaded, lightning.

At midnight on May 10th, 1890, I noted in the southern sky a number of looped, beaded flashes of lightning, a pair of which

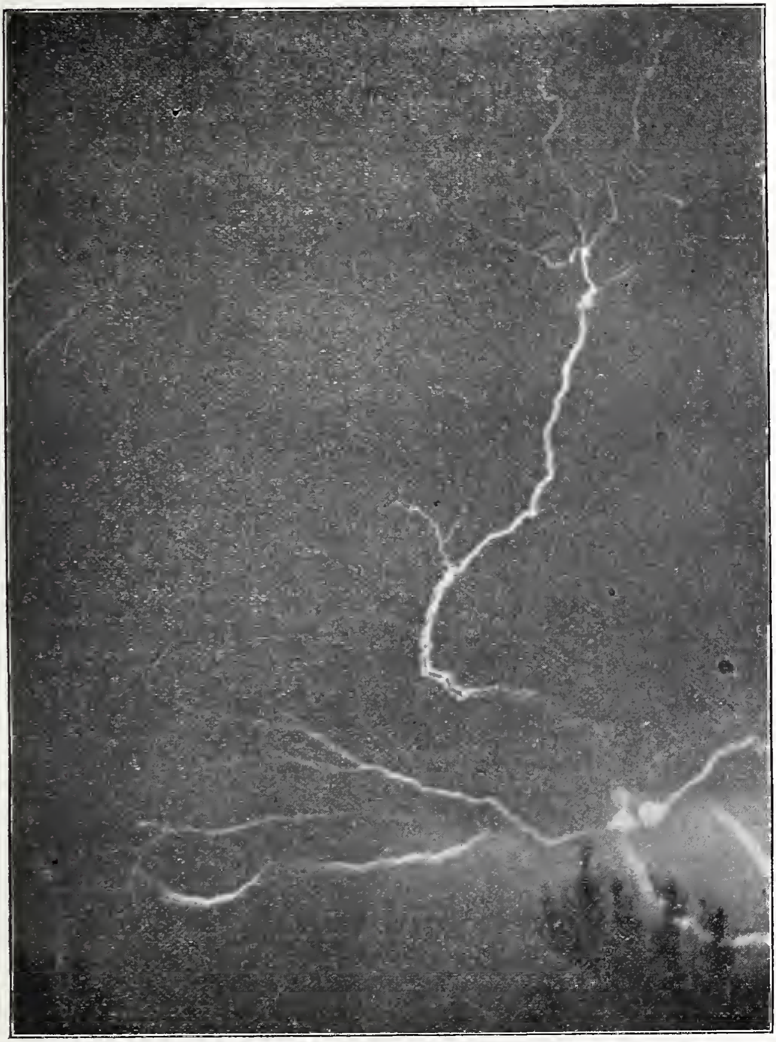


Photo. by W. N. Jennings.

I was fortunate enough to capture with the camera. This is the track of a thunderbolt—a rotating ball of fire moving slowly

through the sky—springing from the ground and returning earthward again.

At eleven o'clock on the night of May 15th, 1892, I saw two lightning discharges, moving at right angles to each other, meet in mid-air, followed by a peal of thunder that still stays with me. This collision resulted in the formation of a thunderbolt—a mass of molten matter sweeping in a parabolic path through the night. I was not surprised upon developing the negative to find a clear record of this Jovian encounter.

FAR FROM THE MADDING CROWD.

BY REV. T. PERKINS, M. A., F. R. A. S., TURNWORTH, ENGLAND.

THOSE who live in England or visit it may find scattered up and down the country many remains of mediæval domestic architecture which will afford promising work for the camera. There is much to be seen besides the well known show-places, the Haddon Halls and Warwick Castles, which are household words on either side the Atlantic. Hidden away out of the beaten track of tourists are many humbler dwelling-places, which, though they may not have played any important part in our country's history, are architecturally interesting, and are also picturesque with their quaint gables and chimney-stacks and projecting wings, with possibly some remains of moat and gatehouse, speaking of unsettled times when, if a man wished to be safe, he had literally to make his house his castle. The defensible peel towers of the Scotch Border, where the lowest story was the byre or stable, and the upper stories, reached by a ladder, were the dwelling-places of the human inhabitants, are numerous and interesting.

In many other parts of the country are to be found remains that have come down from mediæval times: the monastery barn still used for the same purpose by the nineteenth century farmer as by the monks of old, with its characteristic Gothic features suggesting to the chance passer-by the erroneous idea that it is an old church desecrated and turned to secular use; the Grange or Abbot's outlying farm-house, where for many centuries past has been heard, as now, morn and eve the swish of milk falling into the milking pail; and the manor house once occupied by the sub-

tenant of the tenant-in-chief who held his land directly from the king. In many an out-of-the-way village and decayed market town may still be seen the remains of the cross, sometimes a simple structure rising from steps where the wayfarer knelt to say a prayer to Saint or Virgin or to the Virgin-Born; sometimes surmounting the hexagonal or octagonal market-house, whither the country folk used to bring their produce for sale on market days.

Of many of these relics of the past no photographs are obtainable by purchase, the professional photographer of the nearest town not having thought it worth his while to incur the expense and trouble of a journey to procure a negative from which he would seldom be asked to produce a print—so rare are visits from the outside world to these remote districts. But it is in these remote districts, the picturesqueness of which is as yet in great measure unspoilt by agricultural improvements, that the artistic photographer will find his choicest bits.

Photo. by Rev. T. Perkins.

WOOL MANOR HOUSE, DORSET, ENG.

Of late I have been wandering with my camera "far from the madding crowd" in my own county of Dorset, one of the least known of all the forty English counties, but one containing a great variety of scenery—wild heaths, rounded downs, flat meadow

land and winding streams, and as the editor has asked me to send him some prints, I submit two for the purpose of reproduction, both of old houses.

The first is the 17th century Manor House at Wool or Wellbridge, not far from a station of the former name on the London and Southwestern Railway between Wimborne and Dorchester, once the residence of the Turbervilles, an extinct Dorset family, introduced under a slightly changed name into Mr. Hardy's book "Tess of the D'Urbervilles," a farm-house now, but one not free from ghostly legend, as readers of "Tess" will remember.

Photo. by Rev. T. Perkins.

MELCOMBE BINGHAM, DORSET, ENG.

The other, an older house, Melcombe Bingham, many miles from any railway, standing in a pleasant valley in central Dorset, built about the middle of the sixteenth century: the buildings enclose a courtyard on three sides; on the north is the oriel front shown in the picture, facing this is the old gatehouse, and between them on the west are the kitchens.

These are but examples of many such old-world houses that time and the restorer have still left to us in more or less perfect condition. How long they will remain uninjured by the mania for restoration and improvement none can say; things move quickly now-a-days, and signs that modern forms of life are invading our sequestered Wessex downs and valleys are already visible. Let, therefore, the lover of old-world ways come with his camera, and not delay his visit too long or perchance he will find that our district also has been brought up to date.

RAPID TRANSIT PHOTOGRAPHY.

By Jos. P. Beach, Branford, Conn.

IT is not an easy thing to find a subject upon which to write for the International Annual that may be of interest to its readers and convey information that will be more or less worthy of a place in its pages. The writer of this, some years ago, experimented with the problem, then popular, of taking photographic pictures from a rapidly moving train of cars or a fast-going steamboat. From a favorable position, a fast-moving locomotive, or vessel, could be instantly caught upon a rapid plate, and excellent negatives could be obtained of a steam fire-engine on its way to a fire.

It was not so easy, however, when the amateur photographer, equipped with an ordinary capped lens, undertook (while riding on a steamboat or on a train of cars) to get a picture of some desirable object.

At that time focusing was one difficulty, while capping and uncapping a lens was almost sure to be followed by blurred, shaky negatives of very little value. Undaunted by many failures, the writer concluded to follow the advice of his father, who once said to me—as a boy trying to do some work with indifferent tools—"My son, if you want to make a good job you must use the best of tools to do it with." Remembering this advice, I procured a first-class lens, with a rapid shutter, and then experimented on the focus lines until I had a diagram almost perfect, showing just where the lens should be set for any specified distance. Other experiments were made to determine the height of objects, estimating an ordinary house at from twenty-five to thirty feet, while elm and other trees average thirty and forty feet; apple trees are about half that height.

The camera was expressly constructed. It was light and easily handled. It could be used by either spring or bulb; and with a dozen double plate-holders, twenty-four pictures could be taken upon any designed trip.

The memory of previous failures had induced me to construct a finder of the size of the plates I intended using, viz. 4x5. With this finder I amused myself whenever I rode upon steam cars or boat, until I had made myself familiar with the many phases of the varied landscape rapidly passing by. The finder was a great curiosity to many of my fellow-passengers, and at times so many

curious people surrounded me that in self-defense I had to turn the ground glass so that it would only show the faces of the persons investigating the lens. It is astonishing how many persons are to be met with who have no faculty for independent investigation, but who, like Cook's tourists, accept whatever the guide chooses to tell them as gospel truth. My conscience disturbed me but a very little when I told a young lady that the instrument was constructed expressly to reveal the features of the future husband or wife of persons who knew how to use it properly. This information was soon conveyed to others in the car, and before I left, several orders with addresses were given me for duplicates of my "machine." Some of the doubtful young women wanted a guarantee that it would "really and truly" reveal the picture of their future husband, and when I solemnly averred that if the fortunate young man was not discovered by the instrument it would be the fault of the young lady who manipulated it, she expressed herself satisfied, and determined to have me make a finder for her without delay, urging me to complete it for her before the following Sunday. I need hardly say that that young lady is still waiting for "the machine that will exhibit to her the features of her future husband."

By the use of that finder I had gained a method of seizing upon favorable moments for "shooting" the flying landscape, and, when I put it in practice with my camera, obtained results that were sufficiently satisfactory to create a desire for greater perfection. On a fast train, over the route to New York, with which I was so perfectly familiar that I knew just when and where I should pass friends' houses, or other prominent buildings, it was comparatively easy to press the bulb and let the "lens," not the camera, "do the rest." Most of these negatives were good, some were quite sharp, clear, and well defined as could be possible under the circumstances; but there was generally an absence of half-tones, and frequently an indescribable confusion on the outer edges of the plate, for which I cannot account.

Architecture, when the light was favorable and the buildings were painted in appropriate colors, came up excellently well, the window-panes and blinds being perhaps a little more prominent than the clapboards and shingles.

Landscapes, at times, came out excellently well. Some of them, taken near sundown, exhibited a chiaroscuro, as an artist would express it, "perfectly charming," as I was assured by an

Associate of the N. Y. Academy of Design, to whom I gave copies of some of these "rapid transit" photographs.

So much for the taking of pictures on a "rapid transit" over a familiar route. It was different when on the trip to Chicago. Objects would appear coming rapidly towards us, and snapped at almost abreast of us, only to be developed out of focus, or mangled by a telegraph-post, tree, or some dismantled old cow-shed. Twenty or more exposures returned only four negatives worth printing for distribution. Half of the others were of value to us only as souvenirs of the trip; the remainder had but few redeeming features, and were passed on into the limbo of failures.

Since then the writer has been on a number of "rapid transit photo-hunting trips," and thinks he has learned how to do "the trick" almost every time. He takes a position, when allowed, on the platform, and standing with his feet firmly braced on the flooring, without touching any other part of the car, body swaying with the motion, camera held as level as possible, and pressed firmly against the stomach, eyes on the passing scene, he estimates, miles before reaching it, just where to press the bulb. As the train reaches this place he glances at the small finder, corrects the level if possible, and presses the bulb. In this manner he has taken many good "rapid transit" negatives. The best one he now recalls was at Elkton, Maryland. The Washington express train was traveling at the rate of nearly fifty miles an hour, and approaching the county fair buildings. These structures are, perhaps, five hundred feet from the railroad track, surrounded by a fence, on which was painted in letters three feet high the name of these buildings. The negative taken at about four P. M. with perfect light, medium stop, reveals every building in sight, with a perspective fence, and on it perspective letters so legible that even a torn handbill (about a bull) pasted on the fence is decipherable with a magnifying glass.

Of late the writer has not done much in the way of taking "rapid transit" pictures. His enthusiasm remains, but the trouble is too much. Some younger experimentalist should take it up and make known to the readers of the International Annual the pleasure to be derived from a collection of such pictures, taken in all parts of our great country.

OXFORD FROM A PHOTOGRAPHIC POINT OF VIEW. . . . .

By Reginald A. R. Bennett, M. A. (Oxon.), Hon. Treasurer of the Oxford (England) Camera Club, Hon. Secretary of the Postal Photographic Club.

THERE was a most original article in the last year's "International Annual," viz., "How to write for a photographic Year-book," the subject of which I thought did the writer great credit. The difficulty usually is to find something not likely to be known before to the majority of your readers, when they are all, presumably, amateur photographers themselves.

Processes are mostly the same for all readers, whether American or English, but places can only be described with any degree of accuracy by those who have actually visited them, and for photographic purposes one requires not only to know them, but to know them well; so that I think a few hints will be of service to those who intend to come to this ancient University on photographic pleasures bent. And they do come here from America, there is no doubt at all about that! I really think that sometimes it is pretty nearly as easy to pick up an American here as it is in their native country! One has only to look at the books in which the names of visitors are inscribed at various places of interest to find several Americans on each page. They also seem to bear a great affection for the place, if one may judge by the enthusiasm displayed by those who were here at the British Association meeting last year, at which we were told that they "did not consider themselves as strangers," and that "your Oxford is our Oxford too!" a sentiment which was greatly applauded.

I have not the least doubt, therefore, that I shall find an audience among the readers of this Annual to whom the following notes will appeal, as if one is only in a place for a short time it is very important to know the best things to take and the right time to take them. My remarks apply generally to the summer months, as we are not usually favored with photographic weather from the end of October to the end of February, though sometimes the latter month elects to be fine and bright, in which case the light is better than in the middle of the summer, when it is apt to be too strong. I should say that, as a rule, between February and August were the best months.

Before you arrive at Oxford you should take the precaution to obtain leave to take photographs in the college grounds, or when you get there your efforts may be frustrated by a determined and photographically unenlightened porter. To avoid this sad end to your enthusiasm, the best plan is to address a letter to the head of the college which you wish to take photos of, and state the day on which you think of visiting Oxford, and any little particulars about yourself which you think are likely to tend to soften his heart towards you. If you happen to have a friend in the University you had better get him to ask, for he is much more likely to get leave than you are; not but what, as a rule, leave is given without much trouble. As the names of the heads of the colleges differ in most cases, I think it advisable to give their titles, as a

Photo. by R. A. R. Bennett.

THE RIVER AT OXFORD (FROM "FOLLY BRIDGE").

person unaccustomed to the nomenclature of the University will be sure to make mistakes in addressing his letter. You must, therefore, remember that the head of Christ Church is the Dean; the heads of Brazenose, Corpus Christi, Magdalen, St. John's, and Trinity, are Presidents; the heads of All Souls', New College, Wadham, and Keble, are Wardens; the heads of Balliol, Pembroke, and

University rejoice in the title of Master; those of Hertford and Jesus are Principals; those of Exeter and Lincoln are Rectors; and those of Queen's, Worcester, and Oriel are designated by the title of Provost. You must take care when you write to any of these gentlemen that it is not vacation time, or they may be many hundreds of miles away, possibly in America, and you will get no reply in time. If you have to come here in vacation time you had better get leave some time beforehand. There are, of course, plenty of things you can take without any permission at all, and the best point for some of the colleges is from the street.

I will now run through the colleges which are most worthy of notice from a photographic point of view, and note the times most adapted for their best points, so that you can mark out your time to the best advantage. To avoid any feeling of insult in the minds of my readers who may happen to belong to any of them I will put them in alphabetical order.

All Souls'. The chief point here is the *chapel*, one of the most magnificent things in its own way that any university can produce. The reredos is splendid beyond description. Any Fellow can give you leave to take it. Best light from 11 A. M. to about 4 P. M. The chapel is open from 12 to 1, and from 2 to 4 P. M. Besides this some may think the inner quadrangle worth a plate; best light rather late in the morning.

Balliol. This is a more modern college than most of the others, as far as the buildings are concerned; the best part is the front, in Broad Street, which can be done in the afternoon. The inner quadrangle can be taken in the morning rather late.

Brazenose. Best feature is the inner quadrangle, with an ancient sundial. One side of this can be taken in the morning early. The other side makes a good picture with the Radcliffe Library (part of the Bodleian) behind it; this can be done in the afternoon from about 3 till 5. The front in the Square, and the "Brazen nose" knocker require the early morning light.

Christ Church. This is the largest foundation in the University. The chief feature is the great gate, commonly called "Tom Tower" on account of the bell which has been thus named, and which tolls every night the number of strokes which there are students on the foundation in the whole University (except when the undergraduates become too excited and cut the rope, which happened a short time ago; this, however, had never been done before, as far as I know, and the results of the insurrection were disastrous

for the undergraduates). The tower also makes a first-rate picture from the street, but this requires late afternoon or evening light; about 5 P. M. is a good time. Other objects here are the

Photo. by R. A. R. Bennett.

ENTRANCE TO CHRIST CHURCH, THE GREAT GATE AND TOM TOWER, OXFORD. PEMBROKE COLLEGE ON THE RIGHT.

"Broad Walk," which can practically be taken at any time, except, perhaps, "high noon," and the river and boats, which require no permission, as they are best from outside the college grounds and on the opposite side of the river. This requires the afternoon light, about 4 P. M. "Peckwater Quadrangle" and the east gate can be taken in the afternoon. The chapel here is the cathedral of the diocese, and is well worth many shots. The time does not greatly signify, but the middle of the day is about the best. As there is no very large east window, the interior follows the usual rules for taking churches. The front of the library requires the very early morning light, and there is a good archway between the quadrangles, which may be taken early in the morning also.

Corpus Christi. There is nothing particularly worthy of note here except the quadrangle with the sundial constructed by Turnbull, and of a cylindrical shape. This dates from 1605. Early afternoon is the best time to take it, and the gateway can then be included in the picture from the inside.

Exeter, Lincoln, and Jesus are on opposite sides of the street known in Oxford as "The Turl." The last-named is the great headquarters of the Welsh people in Oxford. All these colleges are pretty much alike, and have no special features, unless I should except the chapel at Exeter, which is worth a plate mainly on account of the wonderful tapestry representing the visit of the Magi. You will want your plate well backed for this.

Hertford, Oriel, Pembroke, University, and Wadham. These do not call for special attention. University is supposed to be the oldest foundation in the University, and if this justifies a plate you can take the entrance from the road in the morning, or the interior of the quad. in the afternoon. Oriel quadrangle is worth a plate, as it is very quaint in style. This should be taken in the afternoon, about opposite the entrance, so as to get the hall-steps. Hertford wants the afternoon light, and Wadham the early morning light, for the view of the buildings from the gardens, which some may think worthy of taking. Pembroke inner quadrangle looks well in the late afternoon light. If the Hall is wanted it must be done in the early morning.

St. John's makes a good picture from the gardens; it wants the early morning light to do it justice.

Magdalen will take you some hours before you have exhausted the subjects. In the inner quadrangle you will find a good view of the Founder's Tower, which is well worth a plate; this wants

the early morning light, not later than 11 A. M. The opposite side of the quad. is worth taking a little later. Through the college you come to the well-known "Water-walks," where you can take plenty of pretty pictures, not omitting Addison's Walk, which is the one on the left as you go into the walks from the college, that is to say it forms the left side of the square, round the field.

The Founder's Tower also makes a good picture from the outer quad., called St. John Baptist's quad. So does the old pulpit in the corner whence used to be preached a sermon on St. John Baptist's Day, when the quad. was decorated with rushes to represent the wilderness. These want the afternoon light. The college makes a grand picture from the road, either from the town end of the bridge, opposite the college school, or from the opposite end of the bridge. Perhaps on the whole it looks best from the latter standpoint, but the traffic is rather great at this point, and is a considerable impediment, unless you can manage very quick plates.

Merton is rather quaint inside, and the tower of the chapel is splendid. This is best taken from "Merton Grove," alongside the college, and in the afternoon. The chapel (formerly also a parish church) is worth taking inside.

The chief points of interest about *Trinity* (in Broad Street) are, firstly, the chapel, which is exactly opposite the gate, and wants the afternoon light, and the old building opposite it across the quad., which is called "Kettel Hall," and is very quaint. This requires the early morning light.

The gardens of *Worcester* are, perhaps, its strongest point. The left-hand side of the quad., as you go in, is very old and worth a plate. This could only be properly lighted on a summer morning very early, if sunny. It is, perhaps, best to attack it on rather a dull day, when the sun will not get in the way. From the gardens the other side of this old building makes a beautiful picture on a sunny afternoon about 4 P. M.

New College. This is probably called so because it happens to be one of the oldest in the place. Round the gardens are the remains of the old city walls, with places to shoot from upon the armed invader. The college itself makes a grand picture from the gardens, but it wants the morning light, or the quad. will not look well. Inside the quad., however, the best part is opposite the gate, and this looks best in the afternoon. The chapel is grand, and is worth a plate, but the figures in the reredos have

only lately been put up, and most of them are not old like the reredos at All Souls'. Through the gate by the chapel door we come to the Cloisters, which are among the quaintest objects in the city. These are worth a plate, but it is a hard matter to get anything like a true rendering of their real appearance.

Queen's. This is a very peculiar structure, and whether it be worth a plate or two or not, depends largely on the individual opinion of the traveler. If it is thought that the inner quad. is worth a plate, the best time for it is about 11 A. M., opposite the entrance, or very early morning to get in the gate from the interior. Perhaps, however, it looks best from the road about 4 P. M.

Keble is the newest college of any importance; its exterior is not likely to tempt the exposer of plates. The chapel, however, is by far the most gorgeous affair in the University, using the word in its proper sense. Here are colors and to spare. The effect on the whole is fine, but you will best succeed if you use an isochromatic plate.

The *Halls* of all these colleges are more or less worth taking if you have time at your disposal. They, most of them, however, require a very wide angle lens. Those most easy to take, on account of their size, are those belonging to Christ Church, Magdalen, New College, and St. John's.

There are, of course, many objects in the city worth taking which do not actually form part of a collegiate building. The *New Schools* are most magnificent, and will repay several plates being taken inside them. The exterior fronts the High Street, and a good shot could only be obtained in the early morning. The "*Old Schools Quadrangle*," in which is the door of the Bodleian Library, possesses a tower which is worthy of being taken. The *University Church*, in High Street, is a grand building, but you will find the tower will tax the capabilities of your wide-angle lens severely, as there is not too much room round it. This wants the afternoon light, about 2 to 5.

The view down High Street is a very grand one, and takes in a large number of colleges and ornamental buildings. This requires the afternoon light, about 3 to 6. The view up it, the contrary way, is also grand, giving the *sweep* of the winding street better, perhaps, than in the other direction. This will have to be taken in the morning.

Broad Street. This is another good subject, the buildings at

ENGRAVED BY MOSS ENGRAVING CO. PHOTO BY MC CRARY & BRANSON.

STUDY.

the end of it forming a magnificent group—the Sheldonian Theatre (where the degrees are conferred on celebrated persons at the Commemoration), the Clarendon Buildings (in olden times the University press), the Ashmolean Museum, and at the bottom the Indian Institute, on which the mantle of hoary age has not yet fallen. For this view you want the afternoon light, between 2 and 5, but if you have a wide-angle lens you can get an almost better view of the Clarendon Buildings from the other side, viz., about opposite Hertford College, in the morning not later than 11 A. M.

The gateway of the *Botanical Gardens*, just opposite to Magdalen College, is worth a plate or two. From its best side, that is fronting the road, it should be taken early in the morning, and certainly not later than 12. Inside the gardens you may get many views of Magdalen Tower and the bridge, &c., and no one will molest you, so you can indulge yourself to your heart's content.

The group of buildings at the end of *St. Giles' Square* is an object usually attempted by visitors. This takes in the "Martyrs' Memorial" and St. Mary Magdalen's Church, with some of Balliol College on the left, if you like. This again is best in the afternoon, from 3 to 5. St. Giles' Square is sometimes called "Oxford Boulevard," from its resemblance to the Paris boulevards, with respect to trees, &c. The building just opposite the church, at the top of Beaumont Street, is known as the "*Taylor Buildings*," and is a picture gallery and school of art. It can best be photographed in the early morning.

I think I have now taken up quite as much space as can be allowed me in the Annual, although I have not attempted to give more than the bare statement of things to be done, there being no room for "fine writing," owing to the multitude of things to be mentioned. Even now I am conscious that much more might have been said, but I must leave my readers to find out further glories of this "paradise of photographers" for themselves, with best wishes for their success in carrying off many a photo that will please them in time to come.

GENRE PHOTOGRAPHY.

By Dr. Hugo Erichsen, Detroit, Mich.

ONE of the most fascinating branches of photography is that known as genre photography, a department of the art-science that admits of a variety of effects and gives full scope to the photographer's aptitude for composition. In order to be a successful genre photographer one must have some knowledge of art and the laws that govern it. There are a number of books that may be perused with profit by amateurs who entertain the laudable ambition of becoming artist photographers. Notable among these is Prof. Van Dyke's "Art for Art's Sake," and H. P. Robinson's work on art-photography. But, in addition to the requisite knowledge the amateur should possess an innate taste for the beautiful, should know instinctively what is becoming or not. Without this indispensable intuition, his pictures will probably lack the grace that distinguishes the conceptions of every true artist. If the amateur is an artist by nature, so to speak, he will have no trouble in composing beautiful pictures and making a mark among his fellows.

A knowledge of the photographic values of stuffs is also of great importance, and may be easily obtained by hanging stuffs of different colors and texture over a screen and taking a photograph of them. They should be left in position until a print is made, which should be carefully compared with the material. It is worth a dozen plates to photograph various dress-goods in this way, and the knowledge obtained will fully compensate for the expenditure of time and money.

Every picture should be carefully planned beforehand. If the amateur has some knowledge of drawing, he will be able to make sketches that will give him a good idea of the composition he desires to produce. At any rate he should have a clear conception of the prospective photograph. There should be no guess work about it. The amateur should know all about his models, costumes, accessories, backgrounds, etc. Models that are accustomed to pose for artists are preferable whenever they can be secured. Unless one's acquaintance is very extended, it is exceedingly difficult to find among one's friends persons who will look natural in the costumes they are to wear, or who will look at all like the characters they are expected to represent in the photograph.

Professional models pose naturally and without affectation, and in the large cities where there are many of them, some can easily be found that will look well in the costumes of any period.

One of the best and most helpful works on the subject of costumes is that issued by the publishers of the Muenchener Bilderbogen. It has the additional advantage of cheapness to recommend it, and all costumes pictured in it are historically correct. The illustrations are not colored, but as color is a matter of secondary importance in photography, that makes no difference.

Artistic accessories and backgrounds are rather difficult to procure. If one is handy with tools, one can fashion many pieces of old-fashioned furniture from the lumber that accumulates in the garrets of almost every house, and if one is diligent in attending auction sales one may pick up many a thing that will come handy in taking an art photograph. In a photograph, home-made costumes and accessories look as well and are far cheaper than those that may be purchased. Unless the amateur is clever with the brush and can paint a suitable background, one of plain gray felt will be preferable, that is for indoor pictures. Out-of-doors the natural background of the fields and woods is better than anything that could be improvised.

But above all, genre photography requires patience. The amateur should never weary of his task, but place his models in different positions and try the effect of various accessories until he is satisfied that the lighting, poses, and all the numerous details that go to make up a good genre photograph are as perfect as he can possibly make them. A picture obtained in this manner will be a joy for ever. Note with what infinite care the pictures of Rudolph Eickemeyer, Jr., are prepared and you will cease to wonder why that gentleman obtained so many prizes at photographic exhibitions.

One word in conclusion, as regards sharpness. In my humble opinion, small pictures should be full of detail, whereas the stops may be wholly dispensed with in taking large photographs. Much will, however, depend upon the subject to be taken, so that definite rules cannot be given. Genre photography was considered of so little importance to amateurs at the international photographic exhibition held at London last summer, that only professionals were invited to contribute to that department, and there was no genre class in the amateur competitions. I trust that this will be

remedied in the future, and that amateurs may take their place in this branch of photography as they have in all other branches of the immortal art-science.

OPALS.

By Digby H. W. Cotes-Preedy, King's Norton, Eng.

"THEY are very difficult to make, are they not?" has often been said to me, inquiring from young photographers whether they have tried opal-making. I always answer the question by the little but emphatic word "no." For when one has had a little practice, the operation is, I consider, easy. Don't get a too strong light to print by; I generally use a medium two-wicked lamp. Exposure, of course, will depend on the density of the negative. Develop in hydroquinone. Fix in a moderately strong hyposulphite of soda bath; then a thorough washing, about 24 hours. I then harden the opal films by means of a chrome alum solution (three minutes immersion is sufficient), after which (while wet) I place the opals on a table or slab, and with the aid of a penknife and T square, trim the sides of the film to make a good picture; then another washing. After they are washed and dried the opals are ready to be placed on little wooden easels; in this manner they make most exquisite ornaments for a drawing-room.

The following curious experience that I once had may be interesting to your readers.

I exposed an opal in the usual way, placing it in an amidol solution for development. Nothing appeared. Though I was aware the amidol was old, I was surprised that no image was visible, for I felt pretty sure I had exposed rightly. Well, I was in a fix, but happening to notice a dish (containing a hydroquinone solution) in which I had developed some negatives, I transferred the opal to it with an extraordinary result, for before I could say "Jack Robinson" the image flashed out perfectly and even all over, as if it had appeared gradually. I developed several more in this funny manner. Brother amateurs, take my tip and go in for making pictures on opals. They well repay any slight trouble, and are splendid presents for your friends and relations.

P. S.—Relations always want presents, don't they?

PHOTO BY C. F. ZABRISKIE. ENGRAVED BY WEEKS ENGRAVING CO., PHILA.

FLY CREEK MILL, NEAR COOPERSTOWN, N. Y.

ARTIFICIAL LIGHT IN PHOTOGRAPHIC PORTRAITURE. . . . .

By E. K. Hough, Fredonia, N. Y.

We all remember the incredulity with which professional photographers listened to the prophecy, a few years ago, that gelatine dry plates would come into general use for regular portrait work. They might do for outdoor work and for amateurs, but for high-class studio work nothing would ever supersede wet plates. But slowly, surely, relentlessly, dry plates have driven out wet plates, until even process plates and magic lantern slides are threatened by the once despised invaders.

And now it seems to me that negative making by artificial light is coming forward to take the place of daylight in about the same slow but steady and relentless way which will surely conquer in the end. At first it was some magnesium ribbon burned; then magnesium powder, blown through flame, in similitude of single-burner lamps; then flash-powder compounds to give more instantaneous combustion, fired by fuse attachments like fire-crackers; and open piles of powder, on shovels, or pans of ashes or sand touched off with matches,—all giving negatives, but bearing in the resulting prints marks of their artificial origin, until inventive evolution produced the Williams and other large flash-light machines, by which a broad, instantaneous, controllable flame is produced giving effects scarcely distinguishable from the best daylight portraiture, and much superior to the average daylight studio work. And latterly the wonderful adaptation of electric light and power to business uses has included photography, and electric plants for studios, both arc and incandescent, are being advertised, and used with great success, it is claimed. Also the Welsbach incandescent gas light is being utilized in photography, and even common house gas, made more brilliant by reinforcing with vapor of naphthaline, will make a very serviceable studio light for portraiture, it is claimed.

All this energy and activity of experiment in search of an efficient controllable artificial light for portraiture indicates a real need, and a just hope that the want can be supplied; and in the light of modern invention who can say it will not succeed?

The sun is the primary visible source of all life and vital energy on earth. I do not wonder at the ancient nations who worshipped the sun and met his first morning beams with praise and adoration, and bade him adieu at night with thanksgiving for the beauty and glory he had thrown over the world, as well as the material benefit rendered to humanity in his diurnal progress. What other visible source of power, unknowable, unsearchable, beyond all human control, yet constant in showering tangible, conscious benefits upon the inhabitants of earth day by day and year after year, until he might well be thought the Supreme Ruler of all the visible universe?

What a degradation to descend from the worship of the glorious life-giving sun to idols of wood and stone! And it may be thought equally senseless to attempt to supersede the light of day by any artificial light in photography. Indeed I have heard of one of our magazine editors saying, "A man would be a fool to make pictures as a business by any artificial light, with the light of day all about him." Yet I think a good argument can be advanced for the use of artificial light in photography if it can be obtained economically, with steadiness and power sufficient to give good results constantly. And the progress of invention seems to give that assurance.

Moreover, artificial light is only sunlight stored up as water is stored for irrigation. Light and heat as liberated by burning wood, coal and gas are only the effects of sunshine for ages stored up, presumably for man's use, as animals have no power to utilize them. And even electric energy and light excited by the power of winds and falling waters are only an indirect effect of sunshine, as it causes the vapor to ascend and fall upon the mountains, giving power as it hurries back to its ocean reservoir; and winds are but air currents unequally excited by the sun's rays. Therefore, although we may seem to slight His Majesty the Sun by using artificial light, yet in truth we are indebted to him for every form of illuminating power. And what a wide range of pictorial possibility artificial light has opened up for indoor and night work!

So much of the most interesting parts of our artificial civilized life takes place at night by artificial light,—banquets, dances, social gatherings, family parties, marriages, all so frequently by night that a record of them can only be obtained by the same kind of light under which they occur. Moreover, ever since I have been a photographer—over thirty years—people have been asking:

" Can't you come and take me in my own home, with my own surroundings. I don't want to be always taken with the photographer's furniture and accessories, as if all the town had the same things and everybody, rich and poor, owned the same kind of tables and chairs. I want to be taken in my own home." And always the explanation had to be given that the light of the best lighted home was not strong enough to make pictures within the time that people could sit still. We could make pictures of the room, but without the people. Now, with rapid plates and good flash-lights, family groups can be taken at home successfully. Also machinists at their work and laborers of all kinds, surrounded by the machinery and implements of their various callings, all true to nature and pictorially correct, not like the labored artificial representations of various trades which have been exhibited as made up in the studio. That artificial light is coming more into use professionally among photographers, the pages of all the magazines teem with evidence.

Many costly experiments that don't pay may be tried, and many well-meant attempts that end in failure may be made, but slowly and surely the use of artificial light will win its way. And who could not wish for a light of ascertained power, under constant control, that would eliminate the variableness of the sunlight, as well as the need of a window in the roof to let it in. The light of the sun varies every hour in the day and every season of the year; clouds and fogs also requiring constant calculation to accommodate the changes of actinic power, often not visible, and only known by experience.

In the crowded ranks of portrait photographers every new element of advantage will be seized upon by the most enterprising and turned to account, and this of artificial lighting among the rest. Thus the work of development and progress in utilizing all the forces of nature will go on as long as man has the power to invent or to discover the " open sesame " to her wonderful secrets.

HOME-PHOTOGRAPHY.

By Robert E. M. Bain, St. Louis, Mo.

THE amateur who labors under the impression that it is necessary to go miles from home to secure artistic pictures is unfortunate indeed, as the best of photography is unknown to him. The most artistic pictures are usually of the "genre" class, and the "homeliest" accessories are the most useful. A "bit" of woods and water or a country lane make very interesting views, but there is a sameness to them that is quite wearying. It is this latter class of work that the tyro makes the most of after his fashion. The artist, however, looks

Photo. by R. E. M. Bain.

PLAYING SCHOOL.

to better things, and seeks them in his immediate surroundings. The nimble housemaid lingering in her household duties to lean out of the scullery window and waste the time of the iceman, or the good-humored cook with her hands in the dough making a batch of bread, with an appropriate setting, make excellent examples of this class of work. If there are children in the family, a little practice will make them most useful subjects, and numberless pictures of them at play or in mischief can be obtained, artistic in themselves and invaluable in later years to the subjects. The

tramp begging at the kitchen door, with or without success, or the ash gentleman in the area are all good subjects. For accessories for such scenes, ash-barrels, stepladders, buckets, pans and other household necessaries fill the need. If it is intended to convey the idea of an interior scene, the furniture necessary can, if desired, be moved out of doors, and afterwards the background can be "blocked out" to give the idea of a white wall. Even pictures can be hung on the outside wall of the house and other small wall ornaments added, and afterwards, when the negative has been prepared, the wall paper can be photographed and printed in if desired. The field is so large a one that I am greatly surprised to note the large number of amateurs who are still photographing the same wood and field scenes that have been "done to death" years ago.

It is noticeable that home scenes are always the most attractive in an exhibition, and yet this is the most neglected branch of our art work. Let me plead with those who have not been attracted to this class of work to give it attention, and the result will well repay the effort. Many of those who have been attracted to photography as a means of adding to their summer's enjoyment, have, upon their return home, abandoned the camera for want of subjects. Try home photography, and it will prove to be far more attractive than that of the summer outing.

HOW TO SUCCEED WITH A HAND CAMERA.

By W. Cooper, Cookham, Eng.

THIS article was suggested to me by an incident last winter. It was a cold, raw, dull day, with a lot of mist in the atmosphere and hardly any actinic light, and I was skating, and on the same sheet of ice was a young lady, who could not have been born when I first commenced photography, flitting about with a roll holding hand camera, taking shots of all and sundry; and noticing she was using a small stop and the shutter at a high speed, I ventured to suggest the light being so bad that the slowest exposure possible would be beneficial, but received the reply, "This is the instantaneous process." How these shots turned out I have never ventured to enquire. I need not say I do not consider this the way to succeed, and in how to succeed the first to be thought of is the camera.

What sort shall I buy? This I am afraid must be left a great deal to how much you can afford, but in any case buy the best

Photo. by W. Cooper.

VILLAGE GOSSIP.

your means will allow, and above all have a good lens. Personally I have a weakness for stout cut films, and a shutter that can

be altered to vary the exposure, as many a subject is improved if you can give an exposure of ⅓ or ¼ of a second, that would be a very poor thing if taken at say $\frac{1}{60}$ of a second; this will allow you to use slower plates (if you know what you are going to take), which are in most hands easier to develop and give pluckier negatives than the extra rapid. Have the finders as large as you can; mine are about ⅓ of a quarter-plate. Many say they don't require them, but I certainly think it is better to have them; then you can make certain when the object or objects are on the plate, otherwise the subject you most want to catch may be partially off, or so much on one side, to the top or the bottom, that the whole balance of the picture is destroyed.

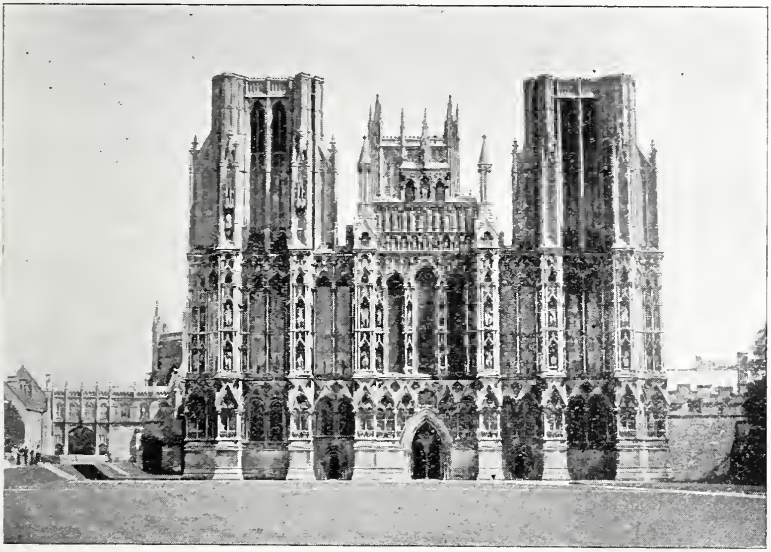


Photo. by W. Cooper.

WELLS CATHEDRAL, WEST FRONT.

A small spirit-level is also a useful adjunct to get buildings, etc., perpendicular. The mode of changing I will leave, but do not have it too complicated, the complicated spring arrangement being apt to get out of order. You will note I am not advocating a rollable film, though these are splendid in their way and most compact, but for a beginner I consider more difficult to work than glass or stiff films. The only release I object to is the push in, finding that it takes very considerable practice, at least with most

of us, not to slightly move the camera when we give the necessary pressure to release the shutters made on this principle.

Having purchased your camera, let us now consider how to use it so as to succeed; and here I would advise, if you really want to do good work, and your camera has not a focusing screen, to borrow or hire for a week or so a stand camera, select an object or objects and photograph it or them from various points of view, and study the results. This will teach you more about lighting than a chapter of advice. A handbook by one of the largest hand camera firms tells you only to take a shot when the sun is shining. I do not go as far as this, but certainly a good light is necessary to get the best results, and this is a great thing to remember, for you will never succeed if you go snapping with your shutter set at $\frac{1}{100}$ of a second on a very dull day or when under heavy foliage, etc. The best lighting is to have the light more or less on the side of whatever you are taking. This gives a roundness; directly at your back gives a very flat picture, and directly in your face, a moonlightish effect. Therefore study the lighting, and if you know it is not suitable don't waste the plate; and by carefully doing this, at the same time thinking if the view or object will make a photograph, you will have many less failures.

How to develop the plate and what developer to use I will leave—there having been so many articles written on this subject alone—but whatever you do, don't commence too near the light, or have too strong a developer to start with. More shots are likely to be under than fully exposed, therefore you want to get out detail and avoid a hard negative.

Don't think the camera can take anything and everything in all lights and from all points of the compass, but use it with judgment, with the same care you would if taking a 10x12 picture. Your failures then should be few, and the resulting fruits worth keeping, and a pleasure to look at at a future day or to show a critical friend.

DANGEROUS SUBSTANCES USED IN PHOTOGRAPHY.

By Robert J. Hillier, M. R. C. S. Eng., L. R. C. P. Lond.

AT the end of the "Annual" for each year will be found a page headed "Elsden's Table of Poisons and Antidotes," in which several of the principal poisons used in photography are enumerated, together with their toxic symptoms and antidotes. This table is exceedingly reliable and accurate, but there are one or two points which may, I think, be added to it.

Mercuric chloride or corrosive sublimate is one of the most poisonous substances kept by photographers, and one which I suppose almost all of them have in stock. Poisoning by this salt is not very uncommon, and the antidotes given in the table are excellent. But in case they cannot be administered at once, which is quite likely, it is worth remembering that a solution of hypo, which, of course, every photographer would have handy, would be a very good substitute to start with, and as it would form an insoluble precipitate with the mercuric salt, would certainly delay the toxic action of the latter, and give time for proper medical treatment to be adopted with every hope of success. In poisoning by cyanide of potassium, I see the table says "no certain remedy," which is unfortunately only too true. The potassium salt is almost as poisonous as hydrocyanic or prussic acid, a fact not generally known, and death is in most cases practically instantaneous where sufficient has been taken to lead to a fatal result.

Potassium oxalate is another poisonous substance which, since the Platinotype process has achieved such popularity, is much more used now than formerly. Like potassium cyanide, the oxalate is almost as poisonous as pure oxalic acid. I fancy that I have myself, on one or two occasions, experienced slight toxic symptoms, such as headache and nausea, from inhaling the steam of a hot solution of this salt. This, however, may be my fancy, as I have never seen a similar experience recorded elsewhere. The treatment given in Elsden's table is excellent.

Pyrogallic acid or pyrogallol, although differing apparently only slightly from gallic acid, which is only very slightly poisonous, is much more deadly than is commonly supposed, and considering the great amount of this substance used, I am surprised that its

poisonous effects are not better known. On searching the literature bearing on the subject, I can find no death reported as having occurred from it, although cases of poisoning from its use as an ointment for a skin disease called psoriasis are recorded in four separate medical periodicals. Elsden's table says that a dose of two grains has killed a dog. Nitro-hydrochloric acid given internally has been suggested as an antidote.

Hydroquinone is not included in the table, as I suppose its introduction for photographic use has been too recent. There can be no doubt that taken internally it has very powerful action, and it has been actually used in medicine to reduce the body temperature, so that if taken in excessive doses it might certainly be classed as a poison. With regard to antidotes nothing is known.

In Elsden's table I find ether given as a poison "when inhaled." This is really the only point in the table that I can find fault with, and to any one used to the administration of ether for anaesthetic purposes it is most absurd. It is not so easy (as is often thought) for any one who is experienced in its use to produce anaesthesia with ether, and when it is borne in mind that a suitable and more or less complicated inhaler is necessary in most cases (and almost invariably with adults) to produce anaesthesia at all, the absurdity of the statement must surely be manifest. To produce satisfactory anaesthesia pure ether vapor must be given with air in the proportion of not less than 60 per cent. of ether, supposing the patient to be a healthy adult, and this is almost impossible of performance to an inexperienced person. Even supposing that a certain amount could be administered, the mental excitement and involuntary struggling occasioned by it would almost certainly stop its further exhibition.

The heading of this article is "Dangerous substances used in Photography," I am therefore not going to confine myself to poisons only. In the photographic literature with which I am acquainted I do not think that nearly enough stress is laid on the extremely inflammable and explosive nature of some of the substances used. Benzine, naphtha, and ether again, are all handled with great want of caution by numerous photographers in close proximity to naked lights, although in so doing very considerable risk is run. I fancy a good many photographers hardly appreciate that collodion is a solution of one of our deadliest explosives, viz. gun-cotton, in a mixture of ether and alcohol. But perhaps the most deadly compound at present known to the pho-

tographic world is the flash-light powder, which contains potassium chlorate and antimony sulphide. These two salts when mixed constitute one of the most explosive and unstable compositions known, and I do not think the danger of storing them together can be sufficiently insisted on. Their molecules are always in a state of most unstable equilibrium, and it needs but a very small chemical stimulus to cause spontaneous ignition of the compound. The presence of powdered magnesium or aluminum also would rather increase than decrease the probability of such a thing taking place. The danger of keeping such a mixture in bulk is, I believe, most serious, and I consider it right to warn every photographer of the grave risk he runs in doing so.

SPECIAL WORK FOR THE HAND CAMERA.

By A. D. Guthrie, Edinburgh, Scotland.

IN looking over the exposures of numerous hand camera workers I have frequently noted the seeming want of object in taking the different subjects depicted. There seems to have cropped up with the advent of the hand camera an inordinate desire, on the part of its possessor, to snap-shot anything or everything which presents itself to view. Of course this style of working may satisfy those who "press the button" for the fun or novelty of the thing, but, to more serious workers, who aim at something above this plaything system of photography, it is different. The hand camera, from the fact of its being available at all times, at a minute's notice, is particularly well adapted for special work, such as the varied and ever changing studies of cloudland, yachting and marine subjects generally, animals, street views and incidents of street life, &c.; and if workers would adopt one or other of these special subjects, their collection would soon prove much more interesting as a whole, both to themselves and others, than the depicting of things of a trivial nature, which are generally of little or no interest to any one, and for the most part useless to their possessors. I would strongly advise those hand camera workers who have grown tired of taking random shots and languish for some new stimulus to induce them to go more systematically to work, to specialize by adopting one

or more of the subjects indicated, and they will, without doubt, take to photographic work again with a fresh interest and renewed vigor.

SUNSET PHOTOGRAPHY.

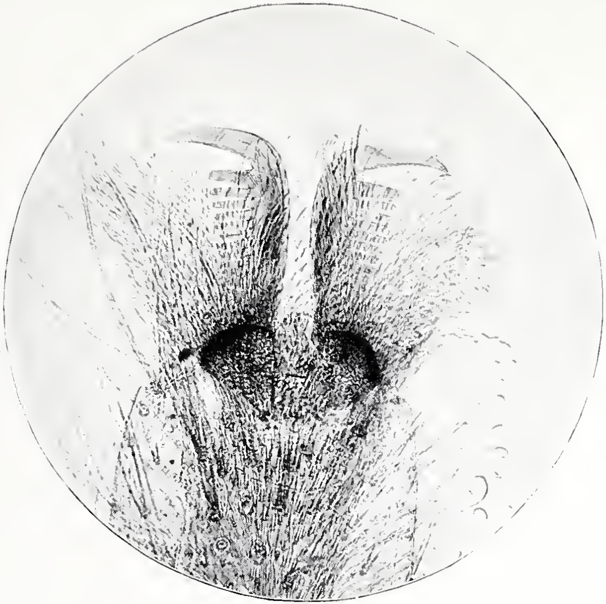
By Ottomar Jarecki, Erie, Pa.

BOTH the very old and the very new photographer have insisted so emphatically on intense light for picture-taking, especially for landscaping, that the subdued light of early morning and of the evening twilight is in danger of being neglected.

While the snap-shottist is crying for "more light," the interior photographer knows that even in these days of fast plates and fast lenses, his exposures may run into hours rather than seconds or hundredths of seconds; still I have myself been surprised with the picturesque results that can be had outdoors in the mild light of evening. All that is required is time and a quiet atmosphere, and it is a common experience that after many a blustering day, when the "winds are never weary," the eventide brings most absolute calm and quiet, and a soft lighting seldom had at any other time except on some cloudy days.

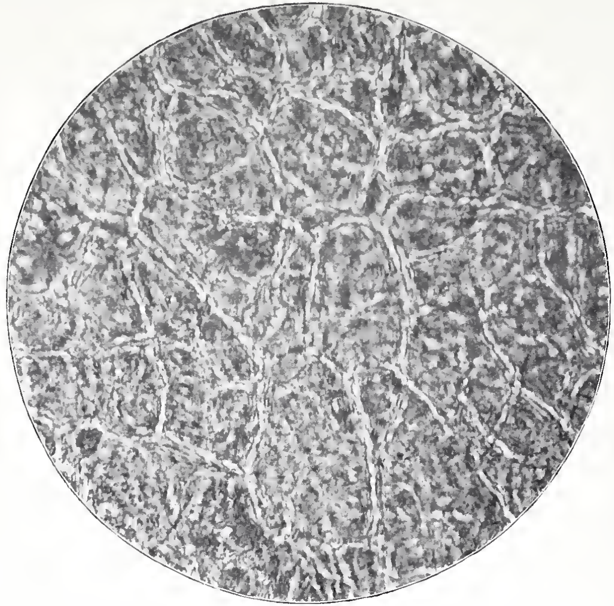
Sunset scenes proper, that is, pictures of the sky at sunset, a little before or after, are always attractive, when the sun has retired behind masses of clouds, and if, besides, there is a path of light across a water foreground the effect is very striking, and I find such pictures are more universally admired, among a mixed collection of views, than almost any other class of subjects, with the possible exception of babies. Even when the sky comes down to a horizon of tree-tops with a necessarily dark foreground, the case is not hopeless, and I have a stereo view taken under such conditions that has given more pleasure to my friends than many another much more photographically admirable production.

It is useless to talk about indefinite long exposures without giving examples for guidance. The view above mentioned was taken on a stormy July evening, a little before eight o'clock, slow shutter exposure, f22 on a medium rapid plate. A duplicate exposure made about fifteen minutes later was a failure from under-exposure, the sun then having gone down. I have another scene



PHOTOS BY M. TOCH.

SPIDER LEG, SHOWING COMB (SMARAGDINA MICROMMATA). X 200.



SECTION OF TOMATO PEEL.

in mind of a little brook in a leafy valley taken after seven o'clock with a Kodak, stop f38, time five minutes, that turned out very nicely.

It will be generally understood that the light value is practically the same a given number of hours after sunrise or before sunset, and I have lately seen a picture of a bicyclist in mock-motion, taken by a friend at six on a midsummer morning, which was perfectly successful.

Of recent summer exposures I might mention a neighbor's home, well embowered among trees and shrubs of an old-fashioned garden, taken at 7.45 P. M.; time two minutes, f28 stop, medium plate, and a duplicate given five minutes time, both of which turned out very bright and pleasing pictures. Of course the developer was modified for the second exposure.

Lastly, in testing a camera for a friend I made an exposure of seventy-five seconds on a street scene about the same time of evening, stop f16. This last plate was developed with ferrous oxalate for the sake of favoring an old gelatine plate that did not take kindly to alkalies, and, besides fogging, also softened under their influence. With the ferrous oxalate this was all obviated, and a clear negative was obtained, somewhat dense in the sky and distance, however. In fact, a developer tending to softness is the proper one to use, as the sky is so very much more actinic than the rest of the view, and not actinic enough to become over-exposed and thin, as in so many midday exposures.

Perhaps some of these details may seem trivial to the reader, but I will confess that just such gossipy bits of information make very pleasant reading for me when somebody else writes them out, and I certainly would advise an experiment or two in a field of photography rather neglected, perhaps with possibilities altogether unsuspected.

AT LAST.

By Fred. W. Pilditch, Aston, England.

WHEN our renowned "Stratford saint," while adverting to "report of fashions" in a foreign state, put into the mouth of John of Gaunt (in *Richard II.*) those not altogether complimentary words,

> "Whose manners still our tardy apish nation
> Limps after in base imitation,"

he certainly at that time did not anticipate the antipathy which until recently existed regarding the adoption of any new condition which necessitated an alteration of present existing circumstances.

Such antipathy has certainly clung to its puny conservatism in more ways than one, and has often been a baneful impediment—for ages past—to scientific discovery and social reform.

However, a new order of things has at length given place to the old, and the dawning of a serener day is *en évidence* into the morning of which Shakespere's "tardy apish nation" is more or less surely awaking. The old idea of now dying times, viz., that it would be highly prejudicial to educate the masses, is almost extinct, and the grand idea of Technical Education is now scattered broadcast over Merrie England, and an unbounded field of opportunities stretches—broadly illumined by the sun of a glorious future—before the junior John Bull of to-day, inviting him to contend, compete and conquer in grades of emulation previously untrodden save by the wealthier of his race.

And how does all this affect photography? I hear some reader ask. How will it not affect it? is my reply. If the State sees the necessity of instruction in manual operation of iron and steel, engineering and wood-working, &c. (as per illustration herewith), will not its representatives also see the demands which photography is increasingly imposing upon them for their deliberations? Nay! they already *do* recognize it, for while I am writing this, Mr. Editor, the Technical Education Board of the London City and Guilds Institute are in solemn conclave upon invited opinions from Captain W. de W. Abney, C. B., F.R.S., as to the best means of mobilizing, maturing and maintaining a "School of Photography," and the result of their decision cannot but be

felt by the whole of the technical school committees throughout our land. Now, most of these schools are fitted with the most approved chemical laboratories and magnificently appointed art studios, wonderfully lighted and exquisitely decorated, and could not a little thought render such laboratories and schools highly suitable for instruction in chemical and artistic photography? Personally I assert boldly that I am sure it could, and the only apology I offer (and I know that I am treading upon dangerous and jealously guarded preserves) is that which I made in this journal two years since, viz., that "fools rush in where angels fear to tread."

Photo. by F. W. Pilditch.

TECHNICAL EDUCATION IN ENGLAND.

Now, why do I rush in? Simply in the interest of our beloved art-science (the photographer's meaning of the word has not as yet been included in our English dictionary, but look into the next edition, please), which is now so advantageously replacing the old forms of reproduction by introducing such approved processes of photo-etching, photo-engraving, process work generally, and last, but not least, by the revival of photo-ceramics, by aiding scientific research, by giving ultra-doubt-evidence of the existence of states only previously surmised or suggested, and by dovetailing itself into every branch of our daily life and system to such an extent that it demands the attention and compels the careful con-

sideration of not only its advocates but from its would-be critical opponents. In conclusion may I say that the higher the work amateurs and professionals can produce, the more deeply they can investigate the scientific principles of photography, the nobler the applications of photographic possibilities they can produce, the more practical the instructions they can inculcate, the stronger will be the grounds upon which to base our and their demands for (what the copyright law of our land terms) "valuable consideration" at the hands of those governing bodies who have the moulding of the lives of the rising generation in their keeping and the future of photography in their power.

FIGURES IN LANDSCAPES.

By Herbert O. Warner, Hartford, Conn.

IN almost everything now-a-days the artistic side is uppermost, and especially is this true of photography. Our friends the painters, while many of them insist that nothing photographic ever was or ever can be artistic, are apt to give us a good deal of advice—some of which can be followed and some of which cannot. There are limitations put upon the photographic worker which oblige him to be severely practical in his methods while aiming at artistic results.

Instead of studying form and color, as a painter does, we must so arrange our pictures that, rendered in black and white, after making due allowance for color values, the various objects will appear as we wish to have them.

One of the bits of advice which painters are most apt to give is regarding the desirability—yes, almost the necessity—of introducing figures in landscapes. A few of our best photographers, and they are but very few, have made a success of this branch and give us the same advice. The fact that there are so few who have followed this idea is significant, and there are several reasons why it is so. The greatest difficulty is that of finding satisfactory models. A painter can do a good many things which a photographer cannot, but would an artist think for a moment of painting a picture without a fairly good model? Certainly not. Why then is the poor photographer, who is hampered by color values and a number

PHOTO BY C. F. ZABRISKIE. ENGRAVED BY WEEKS ENGRAVING CO., PHILA.

OAK CREEK, NEAR COOPERSTOWN, N. Y.

of other things, advised to embark in a venture which his adviser, were he urged to do so, would look upon as a foolhardy thing?

It is all very well for any one to say in looking at a picture that a figure here or there would have improved it. It is very likely to be true. I have seen and taken many such pictures myself, and have wished a great many times that I could have improved my pictures in that way. But let us think for a moment of the difficulties of getting a proper figure to introduce.

Suppose your subject is a brook running through a meadow with trees on one side and needing something to balance it. Will your friend who accompanied you, dressed in the latest style of summer clothes, standing awkwardly on the bank and holding a crooked stick picked up near by (which no one in his senses would ever think was a fish-pole), furnish the required balance? He might as regards form and color value, but would it not spoil your picture? But, on the other hand, it may be said that in country pictures the figures should be *of* the country. Granted. Suppose, then, that we have a pair of bars through which one might pass to a berry-field, and one or two country girls with baskets or pails could be found who would be willing to stand for a moment to complete the picture. Would it not be apparent, nine times out of ten, that they were much more interested in thinking of the way their gowns hung and wondering if the holes in their shoes would "take" in this, perhaps their first, picture, than in maintaining a pose suitable to the occasion?

Occasionally, of course, models may be found "on the spot," as it were, which will be fairly satisfactory, but it is a rare thing that a model can be found that in style and color of dress will exactly suit the occasion, to say nothing of their inclination to stand or sit in unnatural positions. Of course these difficulties would be much lessened if a professional model could be readily obtained, but I am speaking now of the ordinary worker who is not able to do that, yet is anxious to make artistic photographs. My experience has been, and I know it has been so with others, that it is a very bad plan to spoil an otherwise good thing by introducing an inharmonious figure—even if you need something to balance your picture. Better use a pile of stones, a log, or some hay.

There are *some* practical things about photography—even if one tries to be artistic—which must be remembered, and I think this is one of them: Not to put anything (human figures, for instance) in

a picture merely because you think some one else has done a similar thing. The circumstances may have been entirely different with the other man, and the thing for you to do is to study your subject and use the materials to the best advantage—not being afraid of leaving out too much, for *simplicity* is being urged on every hand, and striving for harmony above all.

If you use figures at all you must remember the wonderful power of the human figure for attracting attention (no matter how small the figure), and that it should form part of the scene itself—never seeming to pose.

I cannot better express my idea than by quoting from "Landscape," the charming book by Philip Gilbert Hamerton: "Figures are dangerous everywhere in a landscape, so that it requires either consummate skill or an instinctive tact and taste to introduce them in such a manner that they may belong to the scene." It seems, then, to me that the conclusion to arrive at is this: That it is better to leave figures out of landscapes, unless so introduced, as Mr. Hamerton so aptly puts it, that they "belong to the scene."

HISTORICAL PHOTOGRAPHY.

By C. H. Cox, Waco, Texas.

IT is a great satisfaction to reflect, when looking forward to the future, that photography has no intellect. It therefore has not the possession of an accomplishment which is the distinguishing gift of the human race—that of telling wilful lies. Neither is it subject to anything worse than a certain limitation of truth, and may be considered free even from errors in a broad and general sense. More than this, it has a faculty of recording what the human eye cannot see, and hence has sources of information of which the mind itself otherwise would be destitute.

It appears as if the value of these qualities had as yet been underestimated for supplying posterity with absolutely authentic facts for history. History itself is simply a record of selected information. Before photography, the materials from which history has been written have been very questionable as to authenticity. Accounts by individuals are all more or less colored by feeling and

prejudice; pictures, by artistic license or incapacity; and the most difficult task for the historian has been to try and answer the old and unanswered question, "What is truth?"

In future, when examining the stores of information provided by photography, the difficulty may rather be the selection from a crude mass of heterogeneous truths, and the winnowing of the wheat from an infinity of useless chaff—useless at least for the historian. But the philosopher and student of man in the aggregate may find materials of value even in the millions of portraits with their inane smile and look of self-consciousness, as types of an age in which the chief objects of worship would seem to him to have been "our noble selves."

It is not with these the present paper proposes to deal, but rather to point out the utility, to the future, of providing some systematic records of our own time, instead of the chance medley which is hardly worth the trouble of preserving at all. In the press, newspapers, magazines and a multitude of publications are constantly selecting and, to a certain extent, keeping, records of events, but the photographer does not always make it his business to choose only what is worth preserving. A few hints in this direction may be useful as suggestions of "what to choose" in contradistinction to the general articles on photography of "How to do it."

The increasing popularity of lectures accompanying exhibitions of lantern slides is a proof of how much a tendency in the right direction is appreciated. These, illustrating a tour in some country or district, are always well received, and just in proportion is their success when thoughtfully taken with such a purpose in view from the first. Much has been done and is doing in this way, and few better and more agreeable methods of imparting knowledge reliably have been devised. The lantern is in the first rank as an educator. Let us therefore consider as adapted to the lantern, first, what is usually the outcome of a photographic trip; and, secondly, what it might be.

The following subjects are simply taken from the records of a tour on the Continent—photographed by four companions. It was through a country teeming with historic and present interest of all kinds—splendid scenery, cities quaint and beautiful in the extreme, and a people picturesque in costume and with national customs worth recording. Here is a list of a number of pictures brought back by our friends.

1. Our party before starting. (The usual pyramidal group.)
2. Jack looking for his portmanteau at the station. (Snap shot.)
3. Our party on the deck of the steamer. (Two groups.)
4. Tom seasick. (Snap shot; very funny to all but Tom.)
5. The pretty passenger. (6 snap shots.)
6. The captain on the bridge—special portrait; he is used to being taken.
7. Group of officers and passengers, all in a row looking at the camera.
8. Porters and hack-drivers on the quay. (Snap shot.)
9. Our hotel, ourselves in the foreground as usual.
10. Harry asleep under the balcony after dinner.
11. The head-waiter.
12. Jack flirting with the barmaid. (Snap shot.)
13. A milk-cart. Tom in the foreground prominently.
14. The City Hall and our party in the Square. The City Hall out of focus.
15. Going for a drive. (Our portraits again, including the driver.)
16. The fat landlord at X——. (Snap shot.)

&c., &c., &c.

A lantern entertainment was got up by these tourists on their return, and though the accompanying lecture was not called "Our noble selves," it seemed to recall Falstaff's tavern bill, "one half-penny worth of bread to this intolerable amount of sack." After the "lecture" was over (it was rather wearisome to any but the immediate friends of the party), a quiet-looking elderly gentleman asked the showman if he would do him the favor to show him one slide again. His request was readily granted. "Which slide?" "That with one of the party caught with a flask to his mouth while sitting on a rock in a wild mountain pass." "Oh! certainly, with pleasure." The slide was again shown. It was considered one of their "screaming funny ones," and perhaps it was. The gentleman looked very carefully at it, and eventually took particulars of the place, &c., and the time of the year; and the exhibitor, flattered, asked him to accept the slide, as he could soon make a better. He did so with thanks. He was asked by a puzzled companion whatever possessed him to take a fancy to such trash. "Do you know," was the answer, "that the lantern slide revealed to me that the fellow had his foot on one of the very rarest plants, which I have been trying to find for years, and this has shown me where to look for it."

Only to think what might have been! These four never might have another chance like that they had thrown thoughtlessly away. Let us see what a party of four under similar circumstances could do, and perhaps it may be a hint to future photographic tourists to make their work of real and lasting value. Firstly, choice of companions must be made according to their tastes and knowledge as well as their skill as photographers. Let us say that A is the artistic member. His sole department, on which the others are not to trespass, will be to look for landscape—beautiful and picturesque subjects in cities; buildings, old and new, with consideration as to their historic and personal interest; clouds and effects, sea studies, &c. A will certainly have his hands full, and besides the actual work he would find he would have to store his mind with knowledge of artistic composition in landscape and the value of shadows, merely as picture making, to say nothing of historical and personal associations connected with the scenes. Getting these together would keep him busy, but the result would more than repay the trouble.

To B would be assigned the people of the country. His department probably might keep him even more busy than A. Their dress, manners and customs, industries and agricultural methods, their dwellings, their holidays and amusements, marriages, funerals, religious aspects, &c. What a world of interest B would find in the characters he would have to study by sheer necessity in order to do his work thoroughly! Here and there his work would cross that of A, in fact each member would have a sort of borderland common to all.

C might take the strictly geological features of the country, including records of all changes by water, upheavals and depressions and various natural phenomena. The strata and formation of rocks and mountains, water-worn beaches, glaciers and their markings on the rocks, clefts and canyons; in fact all signs of traces of volcanic action—action of all kinds would come under his department. Let nobody think C would have a sinecure, and for actual value of results I incline to think he would come out almost the top of the class.

D would have a charming department, and probably might be considered to represent the poetic element of the tour. His pleasant task would be the botanical. To him would fall to record the grandeur of the old forests as well as their tender beauties and changing aspects. The rugged pine gnarled with a hundred win-

ters, and the trembling aspen by the brookside, would be all his own; the stately cathedral aisles of the forest and the tangled undergrowth below; the grass of the meadow; the lily and sedges of the pool and the long reeds of the marshland; the lichen and moss of the rock and old tree-trunk, and close foreground studies of the flowers growing and blooming in dells and wayside nooks. Endless vistas of work would open before D, and perhaps for pure delight in his work he might be the one most enviable in the party. Now, if these four on their return gave a lantern lecture, jointly prepared and selected from the best of their work, I venture to predict for them an amount of success and a result of such value as would be a surprise even to themselves.

Besides this, they and similarly arranged parties might present to some educational establishment the records of the country they had visited, and so make their study a permanent benefit to others unable to see the reality. In fact they would have made history.

Can nothing of this kind be undertaken by societies? They have done much already, only I have not heard of any such subdivision of subjects as suggested, though possibly it may have been attempted. The only value of my hints is to bring it more clearly before the amateur, who is often the pioneer both in science and art. These would lose half their progress without him; for, after all, he does his work for the love of it, and that is the true spirit of every discoverer, and the nearest as well as the surest road to success.

OLD FRIENDS.

By H. H. Williams, Simeon, Va.

NEW friends that are well dressed in the latest fashions are very apt (for a time at least) to put out of joint the noses of old and well-tried friends whose apparel we may decree a little out of date. Now it seems to me that this is somewhat the case with some of the printing out papers with which the market is flooded. The older silver processes seem out of it. Albumen and plain salted papers are quite in the background. I doubt if many of the "press the button" crew have even heard of them!

Open before me, as I write, lies an album of views by my late brother, having the date of 1864. The prints are on albumen

paper and gold toned; the bulk are as good as the day they were done, and the brilliancy is up to anything I see now. The negatives (a few of which I have here in Virginia) were good and strong, full of detail, and plenty of contrast as well. This is what you must have if you want vigor in the print. Many seem to think you can't get this in gelatine, and judging from negatives I have sent me to make lantern slides from, don't think of anything but detail. Now I *know* you can get just as good and vigorous negatives on good gelatine plates as ever were made on collodion. Exposure must be right, development carefully done and not stopped too soon: this is the place where "bromide of brains" comes in.

Albumenized paper will give first-rate results, and, as I have shown, is fairly permanent; 31 years is not a bad test. The best results are got with paper that has not had the acid-bath to make it keep; the ordinary commercial ready-sensitized paper does fairly; the home-sensitized much better.

Plain salted paper is what I like best of all the silver processes, and certainly is the most artistic. The way I prepare it is: Take best quality drawing or, if smooth surface be wanted, ordinary photo-paper and soak it well in warm bath of: ordinary starch, 90 grs.; common salt, 30 grs.; water, 16 ozs. Mix the starch with a very little cold water and then add the remainder; put in the salt and boil for a few minutes. A few drops of pure carbolic or oil of cloves are needed if you wish to keep this solution. When the paper is *thoroughly* soaked hang it up by one corner to drain; when dry it is ready for sensitizing with the ammonio-nitrate of silver, made as follows: Take 60 grains pure nitrate of silver for every ounce of solution that you wish to make. Dissolve the nitrate in one-half the total quantity of water. Then take pure liquid ammonia, drop it in carefully, stirring meanwhile with a glass rod. A brown precipitate of oxide of silver first forms, but on the addition of more ammonia it is redissolved. When the liquid appears clearing up add the ammonia very cautiously, so as not to incur excess. In order to still further secure the absence of free ammonia, when the liquid becomes perfectly clear add a few drops of the silver solution until a slight turbidity is produced. Lastly dilute with water to the proper bulk. *The paper must not be floated on this solution.* Take a large camel-hair brush that is mounted in quill, not metal, and thoroughly wet the paper with the silver solution by drawing the brush first lengthways and then

across the paper, so that every part is well and evenly wet. Hang up by one corner to dry. You must use it as soon as made, or it will go yellow. Print in the sun deeply, wash, tone and fix in the ordinary way. I use bicarbonate of soda and gold, and can get

Photo. by H. H. Williams.

"IT BEGAN WITH A CHAT OVER THE PALINGS,"

a black tone if I wish. Various tones and results can be had by using arrow-root, corn-starch, or rice-flour, and ammonium

chloride can be used instead of the sodium chloride. Points to ensure success are, strong negatives, quick printing, fresh paper.

Be sure you wash your brush clean each time used, or you won't have much brush left. Water-colors can be used without any

Photo. by H. H. Williams.

"AND ENDED AS USUAL."

trouble on these prints, and they will stand rough usage. Be careful to go over every bit of the paper twice with the brush, and don't

let the wet surface touch anything. Should you fail in getting good results, and will write me, I'll do my best to help you over the difficulty.

COLORS FROM BLACK AND WHITE.

By Manly Miles, Lansing, Mich.

THERE appears to be a rapidly increasing prospect that the natural colors of objects photographed will before long be looked upon as among the ordinary requirements of the art. As attention is so generally directed to this "consummation devoutly to be wished," anything relating to the production of colors must be of interest as furnishing some possible clue to the lines of research that can be profitably followed in gaining the desired end.

The notice of the "McDonotype process" in the March number of Anthony's Photographic Bulletin has prompted me to describe some of my experiments in producing colors of the spectrum from black and white, as they may serve to suggest, or possibly illustrate, the principle on which this process is apparently based.

A brief review of some of the established facts in the physiology of vision will aid in tracing the manner in which the results obtained are brought about. Waves or undulations of the ether falling upon the eye produce impressions that are conveyed by the optic nerve to the brain, and interpreted as the sensations we recognize as light. By means of a prism, or the ruled lines of a grating, a ray of white light is resolved into its constituents, and shown to consist of a number of rays, each having a wave-length peculiar to itself, and these transmitted to the eye are interpreted as distinct colors, which in the solar spectrum are arranged in a definite order. The range in length of the ether waves of these visible or color rays varies from about 33,000 per inch in the extreme red of the spectrum to about 64,000 per inch in the extreme violet. The waves of the ether outside of these limits are more numerous than the visible rays, but the eye is not tuned, as it were, to receive impressions from waves longer than those in the red or shorter than those in the violet.

The sensations we call light and color are therefore purely subjective phenomena, the result of physiological activities. The

waves of the ether sent out by the sun, which we recognize as the great source of light, do not diminish the darkness of interplanetary space through which they pass, and it is only when they come in contact with the minute particles of matter diffused throughout our atmosphere that they produce the impressions on our eyes that give rise to the sensations of light and color.

A sunbeam admitted to a dark room traces its path in a bright band on the minute particles of matter floating in the air, and it was shown by the elegant experiments of Tyndall that when this "floating matter in the air" was removed, the path of a sunbeam or of an intense electric light in the purified air could not be seen, as the conditions presented were approximately the same as those that prevail in the "blackness of interstellar space." There were no diffused particles of matter to reflect the waves of the ether to the eye and develop the sensation of light.

Without citing further evidence, it must be evident that the apparent color of objects depends upon their properties of transmitting to the eye impressions that are equivalent to those produced by definite wave-lengths of the ether. We must not, however, assume that the sensation of a particular color is an indication that a wave of the ether of a definite length has been impressed upon the eye, as will appear from the effect produced in mixing certain colors. A blending of red and yellow, for example, results in the sensation of orange, but it does not follow that the combination of these two colors of different wave-lengths gives an intermediate wave-length characteristic of orange. The result is purely physiological; the combined ether-waves of red and orange make the same impression upon the eye as the particular wave-length of orange. An object that gives out rays that we recognize as representing a particular color may be subjected to conditions that modify the impressions received from it by the eye, and thus change its apparent color. A grating of fine lines, or a peculiar distribution of minute particles of matter, interposed, or even the motion of the object itself, may bring about this result, and a satisfactory solution of the problems in color photography must be sought in lines of research relating to these physical and physiological reactions.

It has for nearly half a century been known that rapid alternations of black and white impressed upon the eye produced color

sensations, but no practical method of readily illustrating the varied color-effects that may be obtained in this way has been pointed out.

After numerous experiments, the best and simplest method of producing colors from black and white I have been able to devise is to revolve disks of white and black paper with lines symmetrically ruled upon them as described below. The disks used have been from three to ten inches in diameter, but on the whole, those of from four to six inches in diameter have been found most convenient.

Two disks, one black and the other white, are made of the same size, with a small hole in the centre of each to fit on a peg forming the produced axis of the whirling table, to fix the axis of rotation. A series of concentric circles are then drawn on the white disk with India ink by means of a ruling pen and compasses, from a centre that is approximately from one-twentieth to one-tenth of an inch from the centre of revolution. These lines may be from ⅓ to ½ an inch or more apart. A radial slit is then made from the circumference to the hole in the middle of each disk, so that they can be interlocked and placed on the whirling-table together, and the relative proportions of the black and white in the combined disk readily adjusted. When properly adjusted and made to rotate, bright lines and bands of color appear which, under favorable conditions, are as bright and distinct as the colors of the spectrum made with an ordinary glass prism.

The colors produced and their intensity will vary with the relative proportion of the black and white of the disks exposed, which can readily be adjusted, and with the character or quality of the light, the speed of rotation, and the thickness of the lines in relation to the space between them. A different adjustment of the disks will be required with light from different sources and of different intensity. When the rotation of the disks is reversed the order of the colors is inverted and the shades of color changed.

A black disk ruled with white lines and interlocked with a plain white disk will give complementary colors. For this purpose black cardboard ruled with the flake-white of artists' tubes, with turpentine to give the required fluidity for use in a ruling-pen, has been found satisfactory. Some of the most striking effects have been obtained with a black disk ruled with white lines interlocked with a white disk ruled with black lines, and in their adjustment to vary

PHOTO BY M. W. THOMPSTONE.

MONKS' FISHING-HOUSE, CONG ABBEY, CONNEMARA.

the relative proportions of black and white a variety of color effects may be produced.

Aside from the blending or alternations of black and white, the character of the surface of the disks, not perceptible to the unaided senses, seems to have an influence on the colors produced. My experiments have been limited in this direction, but it is evident that a solution of quinine brushed over the disks before ruling increases the intensity of the colors towards the violet end of the spectrum.

Almost an infinite variety of color effects may be produced with these disks by varying the conditions of their adjustment and rotation as already noticed. The black and white of the disks cannot be changed by the motion to which they are subjected; they are still free from objective color and remain the same as when at rest. The colors perceived must therefore be attributed to the rapid alternation of white and black, which produces the same impression upon the eye as the definite waves of the ether that characterize the particular colors observed, as in the case of the mixed colors above noticed.

The "McDonotype process" of color-photography appears to be an application of this principle; the fine ruling of lines and the diffused particles of matter are made available to impress the negative with certain physical characteristics of the various colors present, and the prints from these negatives when seen under the identical conditions that produced them give rise to the same impressions upon the eye as the natural colors of the objects photographed.

USEFUL ADVICE.

By A. C. Champagne, Paris, France.

THE method of packing negatives ought to be seriously taken into consideration. I have adopted a plan which, though not greatly in use, I can, by experience, say is the best, surest and quickest. First, lay the glass plates face to face, two by two, the gelatine side inwards, with no paper or cardboard between, and bind tightly each pair with a sheet of black needle-paper, and put them all in an empty dry-plate box, closed by one or two elastic bands. Before putting the plates face to face it is most necessary to brush and clean them carefully.

The ordinary short brush is not reliable, and I have replaced it by the following little implement, which can easily be made in a few minutes. Take a small flat piece of wood, 5 or 6 centimeters wide, and glue or nail to it a piece of woolen cloth, which must stick out a little on both sides. Rubbing with this apparatus is much better than with a brush, which does not always remove dust and foreign stuff sticking to the gelatine. I have found that this plan has protected the films and preserved the glass from damage.

When I returned I found I had 150 negatives, and had but little time to develop them. Wishing to get the best pictures from them all, I would not try the so-called automatic revelators, such as amidol or metol and other new reducing agents, but I preferred pyrogallic acid. I used this last one, by using the Meydenbanker method, where a vertical pan or basin is used, with grooves and a well-diluted developer in which 12 plates can be treated at once. I must say that I was so pleased with this system that I do not hesitate to recommend it to tourists and all who have a large number of plates to develop, to give it a trial. I have no doubt the results will be good and, at any rate, of a better standard than those effected by other developers.

This system, though appearing rather lengthy, is really expeditious, as in one hour we can get a complete development of 12 plates, which means 4 or 5 minutes per plate; another advantage is that it is very economical.

A WORD TO AMATEURS FROM AN AMATEUR.

By C. M. Giles, Paterson, N. J.

THERE is one sin of which very many, if not most, of our amateurs are guilty, and which goes far to justify the hostility of the professionals. Having been myself guilty, I feel that I can afford to speak a word of caution boldly. That to which I so bluntly refer is the all too frequent encroaching on the field of the professional in a very amateurish way. Don't for a moment think I am going to say you must not take any photographs except for your own use or to give to friends. What I do mean to say is that if you do take

photographs for pay, *make the persons for whom you do the work pay something near what the work ought to be worth.* Not necessarily just what your work is worth, but *what good work is worth.* Why? Because it is no more than justice and fair play to the man who has his capital invested in his outfit and depends upon it for the support of his family. Figure up the cost of your material, used *and wasted*, count in your time at fair wages, and set your price accordingly. If you must take part of his work away from him, don't in addition give the public an idea that he has been robbing them because he has tried to make his art pay him the wages of a good mechanic. One curse of our recent hard times (I am afraid some will say still present) has been the undue cheapening of things, and the necessary deterioration in quality. Above all things, anything in the nature of art ought to be the last, although it usually is the first, to feel the influence of this tendency.

Let us each endeavor, as far as opportunity is ours, to raise rather than lower the standard. While feeling the pressure of hard times and the necessities of enforced economies, every one has been tempted to overwork Poor Richard's maxim that "a penny saved is worth twopence earned," and the result has been the strengthening of the hands of the taskmasters in the sweat-shops and all their evil kindred. As a new light and a new hope come to our business horizon, let us all try not only to develop good negatives but brotherly kindness as well.

ON SPEED DETERMINATIONS, AND ON MODIFYING DENSITY RATIOS AND COMPENSATING FOR VARIATION IN EXPOSURE, DURING DEVELOPMENT. . . . . .

By W. K. Burton, Imperial University, Tokyo, Japan.

MESSRS. Hurter and Driffield having now, I understand, recognized that they were wrong when they stated that "the great mistake the photographer makes is in assuming that the opacity ratios are alterable at will," that "it is a fallacy to suppose that errors in exposure can be remedied by judicious development," and in some of their other

statements, it is now worth while calmly to consider what these experimenters really have done for us, the more especially as too much rancor has often been shown in criticising their conclusions—never, I think, in criticising their methods. The mere errors that Messrs. Hurter and Driffield fell into—making wide generalizations from insufficient data, a common mistake in the use of the otherwise useful inductive method—would not have given rise to such rancor. It was the attitude assumed in their first paper, the carelessness with which they trampled down, or tried to trample down, the principles which had guided the every-day work of practical photographers for the past 15 years, their failure to recognize any work but their own, and the general style of "from high to low." All this without intent, I imagine, as I have heard that both are men of the greatest modesty.

The rubbish being now cleared away, we can see what Messrs. Hurter and Driffield have actually done for us, and any fair-minded person will see that it is not a little.

In the first place they established (development remaining constant) a distinct relation between the quantity of light falling on a film and the "density" or actual quantity of silver that the developer would reduce. In the second place they established a distinct relation between this same density and the "opacity" or the capacity of the deposit to arrest the penetration of light. As scientific discoveries, the establishment of these two relations is of the greatest interest, but most who have really taken the trouble to test the matter will consider the practical outcome of the work, the method of determining the sensitiveness of plates with a much greater degree of accuracy than has been possible with any mere "sensitometer method," the most valuable of all the results of the investigations.

If this method is not perfect, it at least relies on the only principle on which it seems likely that a perfect method ever can be evolved. Messrs. Hurter and Driffield have discarded altogether the measurement of the smallest quantity of light that will make a developable impression, and have rejected any measuring of a single density. Their speed determinations are based on a measurement running through all the densities actually used in ordinary photographic work.

That the method is not yet perfect must be admitted, I think, from the statements made by users of the system, that whilst the

PHOTO BY C. F. ZABRISKIE. ENGRAVED BY WEEKS ENGRAVING CO., PHILA.

SUSQUEHANNA RIVER AT WATER WORKS, COOPERSTOWN, N. Y.

sensitiveness of the plates sent out by them (any one particular firm) may be relied on as being correctly designated by the H. & D. numbers, they cannot guarantee that the same relation will exist between plates of their make and marking and those of other firms using the system. This might be thought to indicate caution merely, but I have it on the authority of the head of one firm using the system, that a given number on a box of plates issued by his firm does not indicate the same sensitiveness as the same number on the plates issued by another firm using the system. Here, however, we are getting, so far as I know, into the much wider question of the want of a perfect standard of light, but there are still two facts to be considered. One is, that in the case of plates coated with emulsions of different characteristics, the sensitiveness in the camera does not of necessity bear the same ratio in the case of different subjects. Two plates may have a certain relative sensitiveness in the case of subjects showing but slight contrasts, and quite different relative sensitiveness in the case of subjects showing very strong contrasts. Again, as Captain Abney has shown, the relative sensitiveness of a quick and a slow plate may be one thing with a short exposure to intense light, another thing with long exposures to feeble light.

That nothing is perfect under the sun is, however, a doctrine that we have all been taught from childhood on, and the question really is, "Does this system make it possible to so indicate the sensitiveness of plates that for every-day purposes the said sensitiveness may be taken as directly indicated by the numbers on the boxes?" Further, "Does this system give figures more nearly indicating the sensitiveness than does any other system whereby the sensitiveness of plates is supposed to be indicated by figures?" I can state from my own experience that, within certain limits at any rate, it satisfies both conditions. Since the system was first introduced in connection with the actual sale of plates, that is to say for some two or three years, I have used plates by the firm which first took up the Hunter and Driffield manner of marking. Just at first the marking seemed to be a little bit "off," but this fact was, I imagine, due to want of experience in the method, and within the following limits I have found, after a little time, that I could absolutely rely on the sensitiveness in the camera being proportionate to the numbers on the boxes: The limits of sensitiveness have been 20 H. & D. to 120 H. & D.; the limits of the exposures have been from

$\frac{1}{125}$ of a second to about 5 seconds; the subjects have been limited to landscapes, figure subjects, portraits and scientific apparatus. I do not mean to say that all my photographic work has been within these limits, but I mean that outside these limits I feel at least doubtful as to the constancy of the ratio of number and sensitiveness. Certainly I cannot say as much as I have just said for any other system whereby the sensitiveness of plates is indicated by numbers.

Plates by different makers, having the same sensitometer H. & D. numbers, I have found to vary quite appreciably in camera sensitiveness, but then I confess that I have not, with any of them, used the "standard developer." A "standard" developer, the same for testing different kinds of plates, seems to me to be an utter absurdity. For each particular plate the standard developer is the developer which suits that plate best, and to state that all dry plates should be tested for sensitiveness with the same developer is only a little less absurd than it would be to say that wet collodion and dry gelatine plates should be tested with the same developer.

As to the possibility of compensating in development for over-exposure, I hold the opinion that the power we have is not only great but enormous. About a year and a half ago I showed that taking a sunlit landscape having fair contrasts, it is easy to compensate for a variation in exposure equivalent to 40 to 1, possible to compensate for differences of over 100 to 1, if the fact of the difference in exposure was known before development was begun. In the case of the 40 to 1 exposures, the negatives were indistinguishable to the eye, those having the longest exposures having as clear shadows—sometimes clearer—than those having the short exposures. In the case of much greater differences, the colors of the negatives were different, but prints from them could not be distinguished. I was told: "Ah, but if the density ratios were measured it would be seen that the negatives were not the same." What in the world does this, if true, matter? I produce with exposures varying as 40 to 1 negatives that print equally quickly, and that give prints from an inspection of which experienced photographers cannot tell which negative had the longest exposure, and concerning which artists cannot say in either case that the tone rendering is better, or worse, than in the other; cannot, in fact, appreciate any difference in the tone rendering. Of what matter

in the world is it to me to be told that an exact measurement of densities would show that the ratio was not really the same, even if it were possible to tell by such measurement—a thing I doubt—which negative had had the longer exposure?

I do not propose here to describe the method of compensating for over-exposure. It has often been described by myself, and by others more capable, but I would say a word on the general principle. I shall leave out of consideration in the meantime the use of different developers, and take into consideration only the variation of the components of one developer—let us say our very ancient friend, pyro-ammonia. We compensate for moderate over-exposure by increasing the bromide—always a component part of this developer; excessive over-exposure, by increasing both the pyro and the bromide. It is, however, my experience that, except in so far as the maximum possible density that the plate is capable of giving is reached or approached, density ratios can be varied very little by varying the ingredients, if in all cases the developer is allowed to act till any further action except that of fogging has ceased. We simply get increased contrast in the case of plates under-exposed, or correctly exposed, increased contrast with reduced fog in the case of plates that are over-exposed, by the use of increased bromide.

The reason why we can compensate so much for over-exposure with bromide is that this substance has the effect of retarding the acquisition both of density in the high lights and of detail in the shadows, but the former to a less degree than the latter. The shadows are, so to speak, kept waiting a little whilst the high-lights are piling up density. I think, indeed, that I have heard this phenomenon described as the "waiting phase of development with a much restrained developer." If that was not the term used, it will serve well enough. Messrs. Hurter and Driffield positively denied the possibility of utilizing this "waiting phase" in practice. Such negative generalizations are generally dangerous to make. As a matter of fact it is, after a little practice, very easy to utilize the "waiting phase" in practice. I have used it myself for just 15 years, and so have thousands of others, though probably not many of them have taken the trouble to analyze the how or why it was that bromide enabled them to compensate for over-exposure.

Concerning acceleration, all that we can do, if we know before-

hand that the exposure has been on the short side, is to use one of the modern developers which, with many kinds of plates, undoubtedly permit us to work with a much shorter exposure than was possible with either of the two old stagers, pyro-ammonia and ferrous oxalate.

With the plates that I have been using I have found no developer that will permit of so short an exposure as the "Crystallos," which I first saw described in *Anthony's Photographic Bulletin* about 2 years ago. I find it impossible, however, to use it at nearly the concentration there mentioned. Its advantage is most marked in the case of plates that tend to work very clear in the shadows.

A VISIT TO A DRY-PLATE FACTORY.

By Emily Culverhouse, Surrey, England.

IN February, 1895, a contingent of fifteen members of the Sutton Photographic and Scientific Society paid a pleasant visit to Cadett & Neal's photographic factory. It is a new but picturesque building situated in the heart of the rural village of Ashstead. A carriage was in waiting to convey the ladies of the party to the factory (which is about three-quarters of a mile from the station), where they were received by Mrs. Cadett and Mrs. Neal, who afterwards accompanied them over the works.

The first place entered was the dynamo house, all light and power throughout the factory being distributed by the dynamo engine. Two duplex engines in the same building rectified the defects and deficiencies of the Leatherhead Water Company's supply by distributing water throughout. A caution was given to us to keep a respectful distance from the dynamo, or our watches would be unpleasantly affected, Mr. Cadett stating he had spoilt five, so after that experience he had one made with springs of palladium and gold lever, which remains practically unharmed. The next building was the glass-examination room, where the glass destined for plates was minutely examined and all faulty sheets thrown aside. The sound glass was then taken to the washing-room and placed in a machine consisting of numerous frames filled with soda and water; soft rollers gently pass over the surface

of the glass, and they passed along to frames filled with warm water, then into boiling and finally into cold water, and at the far end of the machine are taken out by girls who carefully handle the glass by its edges, fingers never touching the surfaces again throughout the process. The pieces are then placed in hot cupboards, and when removed are found to be dry and brilliant. Two hundred whole plate glasses are cleaned per hour, and all the work of filling and clearing the frames is accomplished by a number of neatly dressed, happy-faced girls.

The next process was coating with emulsion made from calves-cheek gelatine, fish gelatine being found not so suitable for the purpose; there were two tons of foreign gelatine in readiness to be made up, English calves being not sufficiently numerous to meet the demand. The emulsion is boiled with steam power in eight coppers. It is sensitized during its manufacture, consequently all the subsequent processes are carried on in rooms from which all daylight is carefully excluded, and light given by small electric lamps shaded with Marion's yellow fabric, a paper which has been found to be the safest light medium for such a purpose. Of course the quantities are a trade secret.

When the emulsion is sufficiently boiled it is taken to the next room and put into a cylindrical vessel, which has a strainer perforated with minute holes at the bottom. A pressure of two tons is put upon the material, and this forces it in slender threads through the strainer. It is then put into cold water and violently agitated, to wash out all nitrate of potash, leaving only the silver bromide.

The next process was coating the plates. This was done by girls with a machine very similar to the glass-washing apparatus previously mentioned. Rollers charged with hot gelatine emulsion faced one side of the glass plates constantly passing beneath, with the utmost regularity, giving each a smooth and equal layer. Then passing through cold water the emulsion face was set quite firm; they were received by young girls who put them into frames to dry.

The testing-room next occupied our attention, and exceedingly interesting it was to watch the men testing the plates from each batch under what I considered a very powerful light for such a purpose, but which I was assured was quite safe for 30 seconds, much safer than gas or any other illuminant. It consisted of a

small electric light, 110 volts, in a ground glass casing; this was placed in a square box frame, one side of which had a centre of special ruby glass; yellow medium paper before the frame completed the lamp. It does not take experts more than 3 or 4 seconds to examine, so that any defects are soon discovered, and the bright light (a most enviable one for an amateur's dark-room) is quite safe.

We then went into the photometer-room, where plates are light-tested and their numbers recorded. This most delicate operation was accomplished by a lady, who did the work with much judgment and facility.

No plates under whole plate size are coated here, the smaller sizes being cut down from the larger at the finish.

In the packing-rooms girls were busily packing, wrapping and labeling the various classes of plates, and putting into boxes with great despatch. There were some thousands of pounds worth of plates ready to send away to gladden the hearts of photographers, for the brand of Cadett gives confidence and is a guarantee for efficiency.

We then adjourned to the top of the building, to the girl employees' pleasant recreation room, where our kind hostesses refreshed our weary frames with tea, &c.; everything appears to be done to enhance the comfort and happiness of the employed. A piano and instruction-books told their own tale, and Mrs. Neal informed me that the girls were taking singing and music lessons, both violin and piano, for which a teacher is provided. The men also had classes for arithmetic and matters of technical education. Of course no dancing could be allowed, as it was imperative to keep the whole building free from the photographer's deadly enemy —dust.

There are about 80 people employed at these works, and it was gratifying to hear of the perfect unanimity that exists between the staff and their employers.

Mr. Payne Jennings, the celebrated photographer who resides near, now joined the party and gave us a pleasing termination to our visit by taking us over to his house to see some of his splendid photographs, some of which ought fairly to become historical and live as a well known painting will, so beautiful were they in every respect.

He gave us some valuable lessons, in the course of conversa-

tion, which space will not allow me to recapitulate here, but will merely say that he advocated most strenuously the use of quick plates, saying plates could not be made too quick for him, and he always used the old pyro and ammonia developer, with bromide of potassium restrainer, as he considered it so much more under control than any other.

INITIATION NIGHT AT THE UP-TO-DATE CAMERA CLUB.

By John J. Woolnough, Toronto, Can.

A burlesque with a motive. Dedicated to whomsoever the cap fits.

Place: Initiation chamber at club-house, with members assembled.

Time: Night.

President advances to head of altar in centre of chamber.

Pres.: Members, brothers all, it is my pleasure great
To bid you here together once again,
Seeking if 'tis your wish to further add
Unto our Club's wide prestige, by the enrolling
Of yet another member, one whose work
I can commend as earnest and sincere,
And worthy to be placed equal in rank
With all we dearly prize.
Him have I sounded, and my expectations,
Based on a knowledge of his constant aim
At something more than mere mechanical perfection,
Have amply been fulfilled.
To watch his kindling eye and heightened flush,
When at full canter on his hobby-horse,
Makes all my inmost self one pleasant glow
Of purest sympathy. And further, when I add
That close on three-score years have bleached his beard,
Once densely dark, into a sober gray,
No other words of mine require to prove
He is no light enthusiast! Is it your pleasure then

That in this sacred chamber he be brought
And duly undergo the solemn rites
That make him once for all a kindred soul?

Members: With one voice—Yes!

Pres.: 'Tis well. Let each one take his proper place,
And form a mystic ring our altar round,
Hand grasping hand in strict conformity
With all our binding rules. Let each one wear
A grave demeanor, as best befits
This ceremony. Ho! guardian of the inner door,
Before our penetrating gaze, bring forth
This would-be brother.

(Novice is led in and takes his stand at foot of altar.)

Pres.: Sir, do you still desire to be installed
Co-equal with each present, and ever strive
To harmonize your ways with all our iron laws?
Whose teaching is that we should raise our art
From out the mud of critic's sneers and gibes,
And place it on the very peak
Of world-wide admiration.
Is this your wish?

Novice: It is.

Members: Hail to you—hail!

(Novice much affected.)

Pres.: Your answer's short but firm; we now proceed
To things of graver import; to prove if you will swear
Steadfast to keep our creed and principles
As duly set forth in this book, formed from a germ
First planted by the son of Emer.
But if 'tis 'gainst your rule to say "I swear,"
Why then you can say simply "I affirm."

Novice: Well, I don't care,
I guess I'll swear!

Members: Prepare, prepare,
He's going to swear!

Pres.: Now open wide your every sense's portal,
This ordeal through, you'll rank with us—immortal!

. . . . . .

On bended knee, with upraised hand,
Swear you'll ne'er join any band
Whose outings in photography
Are leavened with a little spree;
A merry school who hie away
Only on a sunny day!
When nature gasping seeks the shade,
They make a photographic raid.
If they feel a spot of rain,
In a panic board the train.
Who know no other joy so great
As having "fired off" every plate.
If you would to us belong,
Swear you'll shun this giddy throng.

Novice: Right glad I swear.

Members: Gladly he swears!—
Pitter, patter,
Round we clatter,
Swiftly circling round we go;
It makes a more impressive show!

Pres.: A summer landscape's passing fair,
But every amateur's been there.
If you would gain an entrance here,
You'll have to seek a wider sphere;
If you would win undying fame,
You'll have to hunt for higher game.
Grasp Dame Nature's every mood,
Humbly mild, and grandly rude;
Note the sunlit shower in spring,
Sparkling like a living thing.
When the city's dust-strewn street

Has faced the raindrops' kindly beat,
See how like a polished floor
It mirrors all that passes o'er.
When the storm-clouds piling high
Hide the sun and blot the sky;
When the wind does fiercer grow,
Mark the tree-tops bending low;
Bending low in fear and dread
Before the giant overhead;
When the earth has lost its green,
When the air is razor-keen,
When the snow o'ertops the fence,
From the fireside get you hence!
These are subjects worth a brace
Of milk-and-water commonplace.
Swear you only *will* appease
Your picture-thirst with scenes like these!

Novice: I swear; and mean to strain each nerve
Your approbation to deserve.

Members: An answer worthy of a king!
So once again round moves the ring—
Pitter, patter, etc.

Pres.: Swear you'll never take delight
In prowling round—a sorry sight—
With box of tricks (the focus fixed),
Inanely snapping left and right.
Hold that right hand high in air
And most distinctly say "I swear."

Novice: I swear.

Members: He swears!
If to that vow he keeps not true
He'll surely rue, he'll surely rue;
For we can swear distinctly too!

Pres.: Solemnly you're asked to swear,
When to these rooms you repair,

Cause no hoarse and vengeful howl
Through wiping dishes on the towel.
Make a point to put away
Every measure, every tray,
Every visit that you pay.
Swear!

Novice: I swear.

Members: Pitter, patter, etc.

Pres.: If there's a weakness we deplore,
It's using stop f. 64.
That mass of sharpness everywhere
Is really more than we can bear.
Every plate that you possess,
"Back" it—never mind the mess.
Let your prints discard all trace
Of a burnished brazen face.
When the promised picture's done,
When the battle's lost or won,
When it's in its little frame,
Oh! be careful how you name;
Don't fall back on some threadbare phrase
Like that old chestnut "Summer days";
For if you do, then bear in mind
You'll reprimanded be,—and fined.

Members: Yes, you'll heavily be fined
If you spring that on us,—mind!

Pres.: If your ardor's fire should fail,
If our cause you e'er assail,
Turn a traitor in our sight,
Suffer then our ban's black blight!

Members: Oh! it's worse than sudden death
To feel our ban's black, blighting breath!

Pres.: Specks and stains your efforts cloy,
Fog and frill your hopes destroy;

Every "lightning" plate you get,
Turn out slower than a "wet";
Toning baths that fail to tone
Peculiarly be your own,
Prints when in the "fixing laid"
Instantaneously fade,
Till you—so bitter is the cup—
Despairing throw your hobby up.
Could any amateur get worse
Than this our regulation curse?
Fondly I hope you'll never feel
The crushing of its iron heel.

Novice: I hope so too;
Indeed I do!

Pres.: There's just one matter to dispose,
Before we draw this to a close.
You'll have admission full and free,
Proud possessor of a key,
When you've paid the entrance fee.
Let us hear,
Blithe and clear,
Have you brought the needful here?

Novice: I have.

Members (rapturously): He has!
Pitter, patter, etc.

Pres.: This ceremony's ended; 'tis now in order
Into an inner room forthwith to wend,
To toast our latest brother. Where clinking glass
And cheerful cry of "Give your orders, gents,"
Will help us pass the short remaining time
Twixt now and smiling morn.
Let us away!

PHOTO BY M. W. THOMPSTONE.

KYLEMORE CASTLE, CONNEMARA.

FLOWERS AS A SPECIAL STUDY.

By Harry M. C. Sprunt, London, Eng.

WHY is it that, after having advanced to a certain stage, the average amateur photographer either gets no further, and in some cases even goes backward, in the quality of his productions? In my opinion, there is only one solution, and that is they do not take up any one subject, but go from portraiture to landscape, then perhaps have a turn at hand-camera work, and so on, never giving themselves time to become proficient in any particular class of work. How much better it would be to keep to one subject and thoroughly master it.

To those who have lanterns I can strongly recommend them to take up flower studies, as forming a very pleasing change from the everlasting run of landscape and architectural slides.

In photographing flowers there are several points to be borne in mind. In the first place, *simplicity;* do not photograph an ordinary florist's bouquet and think it will make a picture, for you are certain to be disappointed, but rather take a few blossoms, preferably of the same kind of flower, which, with a few leaves, ferns, etc., will, with a little artistic judgment, give an effective result; and it is a very striking fact that the commonest flowers will very often give as good a result as anything, even thistles and other weeds can be pressed into the service. It is not always advisable or convenient to show the vase containing the flowers in the picture, but should you do so, it is nearly always better to place flowers with long stems in long, narrow vases, and short, bunchy flowers in the reverse. In both cases the plainer and less obtrusive the vases the better. A good background can be made from very common serge of a grey or drab tint, which should be stretched on frames to take out the creases, and be placed at not less than 2 feet behind the subject, so as to be out of focus, thereby throwing the picture well forward. A very good way to treat the background is to paint it out completely on the lantern-slide with black varnish. The lighting of the subjects should be very soft; give full exposure so as to obtain all the delicate details, and develop as for portraiture. In most cases it will be found necessary to use isochromatic plates, but only under very special circumstances will a screen be found necessary; in fact, in a good many

instances a screen would do much more harm than good. Great care should be taken when developing isochromatic plates, as they have a tendency to give hard negatives, which are quite unsuitable for flowers. A long focus lens should be used, say about 8 inches on a $\frac{1}{4}$ plate, and it is in most cases inadvisable to stop down lower than f16, a small stop tending to give a very flat result. Warm tones in the lantern-slides are generally much better than black.

In conclusion might I suggest you take a small box, about 6 inches square, with you on your country rambles, to bring home specimens of the wayside flowers, from which you will be enabled to make an endless variety of beautiful pictures at very little cost or trouble.

CHANGES IN PLATINUM PRINTS.

BY CHAPMAN JONES, LONDON, ENG.

PERMANENCY is a quality of such paramount importance, and platinum prints have held such a high position in this respect, that it appears almost out of place to suggest that they are liable to change. But it is matter of fact that occasionally a platinum print has been known to alter in appearance, passing from a healthy gray to a rather sickly yellow, though not to that feeble yellow that often precedes the almost total disappearance of the image in silver prints.

It is gratifying to know that although it is the rule for silver prints to fade, it is a rare exception for a platinum print to show any alteration, even when carelessly made, and that there is a radical difference between the two cases. It is the silver image itself that is affected in the one case, but in the other *the platinum has never yet been shown to be liable to any change whatever.* The writer has examined this matter critically and finds that it is impossible to get quite rid of the iron used in the preparation of the print, and that the iron remaining is sufficient to account for the changes that have been observed. The platinum image itself remains unchanged, and it is quite easy to restore any changed print by treating it with dilute hydrochloric acid to which has been added a little sodium hypochlorite.

Platinum prints therefore remain the most permanent kind of

photographs known. It is desirable to prevent as far as possible the iron that remains in them from being the cause of any change, and for this purpose it is recommended to rather increase the treatment with acid after development, and to treat the finished print with common care. It should not be mounted with sour paste on the cheapest board, because, although this will in no way affect the platinum, it may lead to a slight yellowing of the iron compounds present.

PHOTOGRAPHIC BOOKS.

By James Shepard, New Britain, Conn.

A BEGINNER in photography, or one who has less than two hundred views, may have them mounted on cardboard and keep them for ready examination without serious inconvenience. But when photography has been followed until several hundred or more views have been taken, "how shall I keep my photographs?" is one of the most important questions that we have to deal with. Everything considered, I believe it is best to keep them in book form, but not in albums, for that is the poorest form of book and involves the mounting, which is objectionable, either for loose cards or a book. A cardboard album is necessarily heavy and clumsy. Cloth-lined mounts of thin paper have been used, and are much thinner than card mounts, but they will warp more or less, even when the views are placed on both sides to hold each other, and oftentimes the threads of the cloth will show somewhat on the mounted photograph.

A very neat and attractive book may be made by printing the photographs directly on the leaves of the book, or rather on the sheets of paper that are to form the leaves, and afterwards having them bound in book form. In order to make a good job, some of the non-curling papers must be used, and the negatives should be masked for printing, in order to give a suitable margin. Platinum and bromide papers are admirably adapted for this work, but I prefer plain silver prints on arrow-root paper. My negatives are 5x8, and I print them on sheets which are trimmed to 6½x9½, with a one and a half inch margin at the left-hand end and a one-inch margin on the other three sides, making the size of view 4½x7.

They could be made longer, but this size is of good proportion, and, as a rule, prints from a 5x8 negative are improved by trimming to seven inches long. How many prints I have seen that would have been greatly improved by merely omitting a quarter or half an inch from the ends, which have nothing of interest and whose only effect is to detract from the rest of the view. The masks or mats may be made of good enameled paper, of a size somewhat larger than the sheet to be printed on, and with a hole cut of the desired size for the view. These mats should be mounted on cardboard having a hole a trifle larger than the size of the negative, the inner edge of the mat projecting evenly over all sides of the hole in the cardboard. It is best to mark sheet-lines all round the mat at the proper distance from the edge of the opening, to represent the size of the sheets to be printed. The paper can be cut to the exact size, or it may be cut a little too large and afterwards trimmed to size. A printing frame as large or larger than the mat must be employed, and the negative placed on the glass of the printing frame. The mounted mat is then placed over the negative, which fills the hole in the cardboard, while the inner projecting edges around the hole in the mat rest on the film-side of the negative. The paper to be printed can then be placed in position. If cut large, see that it covers all the sheet-lines on the mat; and if trimmed to the exact size, make sure that it is placed with its edges exactly on the sheet-lines. Then proceed in the usual way, the result being a $6\frac{1}{2}$x$9\frac{1}{2}$ sheet with a clear white margin of one inch, and an extra half-inch at the left-hand end to allow for binding. After removing the print from the frame, other negatives can be placed under the mounted mat for printing, and all the prints will be properly centered. Sometimes one end of a negative may be defective, or for other reasons one may wish to print closer to one end than the other. In such cases the mounted mat will not answer, and I make special mats and gum each one directly to the film-side of the negative for which it was made, bringing the opening in the mat in front of the most desirable part of the view. In some cases mats with different forms of openings may be used, while the size of the sheets remains uniform.

The printed sheets can be tied into a book or bound in any desired manner. It is very inexpensive and quite neat to have them bound in flexible covers at a regular bookbindery. A book

PHOTO BY HEMPERLEY ON CLIMAX PLATE

ENGRAVED BY PHOTO-ENGRAVING CO., NEW YORK.

STUDIO STUDY.

with three hundred prints will be only about the usual thickness of a cardboard album containing 24 card mounts. Such books are not only desirable for their neat and compact form, but one may have a book for each year's work, or for the views taken on some particular tour, or books for different localities or for particular subjects. By having them permanently bound the sets will never be broken by letting prints go with the intention of replacing them and then neglecting to do so, as is very apt to be the case with a lot of separable views.

One would be surprised to see what a neat and attractive book may be made even with the cheap and much despised blue-print process. There is no process that is better adapted for fancy printing. I have in mind a blue-book of views illustrating a poem on Indian Beach, Fla. The pages of the book are 8 inches wide by 10½ high. The cardboard covers are printed on both sides of the paper, the first page being printed from three different plates. In the center of this page is a 4½x6 view of a part of the beach in blue on a white ground, and in white lines on a blue ground is an Indian with a bow and arrow skulking in the bushes. In the sky in faint letters is the word "Indian Beach." The surrounding portion of the cover is printed with small ornamental figures in white lines on a blue ground.

To print this cover the bristol-board paper was first covered on one side only. The word "Indian Beach" and the figure of the Indian were drawn in black lines on tracing muslin, and then placed directly in contact with the film-side of the negative, taking care to bring the lettering and figure over the portions of the negative for which they had been designed. The negative was masked so as to print only the central portion of the page, the mask being large enough to protect all the rest of the sheet. After printing the central portion and before washing, the remainder of the page was printed from figures drawn in black lines on tracing muslin, a patch of enameled paper being placed in the center to cover up the portion first printed. After proper washing and drying the other side of the paper was coated and printed in the usual way. In printing from the negative and the drawing on muslin at one and the same time, the muslin was so thin that it did not lift the film of the negative out of contact sufficiently to make any substantial difference in the sharpness of the print.

The other leaf of the cover was printed on its entire outer page,

with the small figures in white on a blue ground, the same as the marginal portion of the first page of the cover, and on the inner page was printed a local view with a clean white margin. The text is type-written, and facing each type-written page there are one or more views from that locality, always illustrative of some portion of the text directly opposite. The views vary in size from $3\frac{1}{4}$x4 to $4\frac{1}{2}$x6 when horizontally arranged on the page; to $4\frac{1}{2}$x7 for panel views, some of them having been made from 5x8 negatives, some from lantern-slides, and others from parts of stereoscopic or 4x5 negatives. All of them were printed from masked negatives to give a clear white border, and when two views appear on one page the paper was first properly gauged to print one view in its designed place, the mask protecting the border and site of the other view; and then before washing, a second masked negative was properly placed to print the second view, while the mask protected the border and the print first made. After properly exposing the second print the sheet was washed, dried and trimmed.

One who has never tried it will be surprised at the neat effect of printing on a large sheet from a masked negative to give the proper margin. Its superiority in appearance over a mounted print is very striking, besides having the prints in better form to preserve. For ten years I was looking for some better way to keep my photographs, and especially to get rid of the heavy and awkward cardboard mounts. Since I began to use the plain silver on arrowroot paper, printed with a border from a masked negative, I have been for the first time perfectly satisfied with the way of keeping my views, although I regret that I did not earlier adopt this plan. In addition to the book form, one great advantage of the plain silver prints is the ease with which they can be touched up with a pencil to cover any slight defect, to better define the site when the sky prints too white, and in some cases to even insert in pencil whatever of the landscape may be lacking, or is faint in the distance or elsewhere from over-dense portions of a negative.

LANTERN SLIDES.

By John H. Shaw, New Haven, Conn.

THIS interesting branch of photography is the amateur's delight after he has mastered it. I will try and describe the method I employ in making lantern-slides. A good slide must have a perfectly clear sky and very sharp detail. To get this the negative must be well developed. I make most of my slides by contact, using a $3\frac{1}{4}$x$4\frac{1}{4}$ plate, and find that the Cramer Crown plate well developed makes the best negative for lantern-slides. All of my work on slides is done evenings. I never allow myself to make over six (6) slides at a time. After selecting my subjects I lay them on a white paper and place them in rotation from 1 to 6, taking the thinnest negative for No. 1, and so on down to No. 6. Then I put them into my printing frames and then go into my dark-room, light my red light and put a slide-glass into each frame, locating it on the negative to suit, being careful not to get my frames out of line from No. 1 to No. 6 as previously laid out. Now place the frames face down and cover them with a dark cloth, then light the white light (I use a 4-ft. gas flame) and hold my frames 18″ from the light. I then take up frame No. 1 and expose it to the light, say three seconds; I expose No. 2, say four seconds, and so on up to No. 6, which will take say 10 seconds for exposure. The time of exposure will only come by practice.

A negative that will show the high lights very clear when placed on white paper will print a slide in from two to five seconds. A little practice and it will be very easy to determine the time to expose.

To develop lantern-slides I use Carbutt's eiko cum hydro with ten drops of bromide of potassium; this developer will work like a charm, bringing out the subject very clearly before the sky commences to turn; develop until the whites begin to turn yellow. A good way to gauge the work is to watch the margin where the sky meets it, and as soon as there is any contrast, plunge the plate into water, rinse and examine by the red light. If the subject is not well developed and the whites not very much discolored, place the plate again in the developer and carry it along a little farther. You can test the plate this way as many times as you wish. Then put the plate through the hypo bath, and if the work

has been done correctly, you have one of the prettiest little gems that photography can produce. Try it and see.

SIDE-CHAT.

By E. Beringer, Cornwall, England.

IT is the common thing for the average camera devotee, desirous of obtaining good work, to expend the bulk of spare cash in appliances of the highest perfection. To a certain limit this perhaps is to be commended; nevertheless it should at the same time be understood that French polish, expensive lenses and a variety of developers are not absolutely needful to good work, and therefore the production of inferior work is not necessarily the result of bad appliances, plates or material. Because the would-be photographer cannot get good results, too frequently the dealer or manufacturer obtains a credit not desired, and is ill-used when he has done his utmost; pyro, a bad name, much abused and deserted for hydrokinone, amidol or metol, which each in their turn lose caste because of the unsatisfactory rendering of the worker's ideal. It is forgotten that a dark-box with a pinhole is all that is essential in the form of a camera for a prize picture, provided the subject is suitably selected and treated. A gain in the lens is like the stop of an organ—it adds to its compass and places an extra effect in the hands of the player. Plates which gain notorious fame at the hands of a clumsy worker are each and all with their particular merit and peculiar effect. Developing agents all possess properties which give great power to an intelligent worker, but only complicate photography to an immense extent in practice to the disadvantage of the novice photographic.

It is about as useless to expect to ring the changes of photography with success without a vast amount of practice as to play the pianoforte well without tuition, application or interest.

A SUGGESTION TO LECTURERS AND OTHERS.

By R. M. Worden, Essex, Eng.

On many occasions and for some considerable time it has occurred to me, on reading the various articles given in this excellent Annual as well as those in the photographic press in general, that a very important item is so often left out by the authors thereof, and that is, with reference to the cost of their suggestions or ways and means by which they have overcome some particular obstacle, or in the adoption of certain appliances other than those set out in the various text-books which are almost out on every branch of this marvellous study—photography.

Scarcely a week passes now-a-days but some good fellow hits upon a dodge whereby he is able to either work a certain process easily and cheaply or has found a neat little plan of, say, photographing the heavens with his ordinary camera, which some one else would like to do, or in connection with micro-photography or other the now endless graphys springing from photography, and is able to dispense with the expensive, and in some cases very expensive, plant.

There cannot be the slightest doubt but what some of us—ay, a good many—are deterred from trying our hands at some of the interesting branches which have sprung from the photographic seed, in consequence of the expense to be involved, and if this bit of information were to form a part of the papers and lectures of the authors, they would be all the more complete and appreciated. Take an example.

Recently there appeared in one of the British photographic papers an extremely lucid and interesting report of a paper read at a meeting, in which the author described the apparatus and instruments he used in micro work, but it lacked this little bit of information, viz., £. s. d. I can scarcely think but that a lecturer or writer could in every instance, and without any extra trouble, add this to his paper.

NATURAL SKIES IN THE NEGATIVE. COMPOUND EXPOSURES. . . . .

By Harold Holcroft, M. A., F. C. S.

THE method of producing natural skies in the negative which is here described is a development of an older plan for varying the proportionate distribution of light falling upon the sensitive plate. I have proved that the idea works out in a satisfactory manner in practice, and is worth the attention of landscape photographers.

It is well known that any shutter which has an up-and-down motion gives more exposure to the foreground than to the sky, but the proportion between the two varies with every change of speed of the shutter, and is, moreover, under no control except in the case of one or two patterns. It occurred to me that it would be a very useful thing if this proportionate distribution of the light could be brought under control with some approach to accuracy.

Having one of Place's old but admirable shutters in constant use, I saw that this was exactly the thing to experiment with; but before proceeding further, perhaps I should describe the action of this shutter for the benefit of those who may not be acquainted with it.

This shutter is usually fixed on the hood of the lens, and there are two thin vulcanite screens which hang enclosed in a frame, and which are connected together by a pair of cords which pass over a light roller at the top of the frame. At the bottom of each vulcanite screen is fixed a light silk cord to work the shutter. The action is as follows: You pull the silk cord attached to No. 2 screen, and No. 1 screen thereupon rises and uncovers the lens, the rapidity being the speed with which you choose to pull the cord; if you continue to pull, No. 2 screen, which has by this time descended close to the lens opening, continues to descend and cuts off the light.

The whole thing is very simple; the screens are balanced and light, and a pull in one direction is all that is required to give the exposure. The length of the exposure and also the entire motion of the shutter is under complete control; you can prolong or cut off the exposure and pull either with uniform or variable motion. In this shutter, which from its construction gives more exposure

to the foreground than to the sky, the proportion between the two can be controlled within limits, which is the important point for the purpose in view; but there is one addition which is necessary to give exactness, and that is the provision of some means of knowing the precise position of the sky-line when exposing. This I easily attained by making a boldly numbered and graduated scale, divided into eighths of an inch, which is fixed on the front of the shutter and at one side of the lens opening. Then when the view is focused and the working diaphragm inserted, if you decide that there are suitable clouds which you wish to include, the shutter is closed and drawn up again slowly while the head is still beneath the focusing cloth, until the shutter is seen to cut off the sky close to the sky-line; you then observe the scale in front and note the division opposite to which the shutter stands, which may be, for instance, No. 8; you now reclose the shutter and insert the sensitive plate and proceed to give the exposure you have decided upon.

If the foreground is to have, say 2 seconds and the sky $\frac{1}{2}$ a second, you pull the cord at a fair speed until the shutter has risen to division No. 8; at this point you keep the shutter in slow motion for a division or two (or what you please) until $1\frac{1}{2}$ seconds are up; then continue the pull quickly until the lens is full open for $\frac{1}{2}$ second more, when a further quick pull promptly closes the lens, and you will have given the required exposure. The description is long but the practical working is simple, and it is not nearly so difficult to give a compound exposure as it may seem.

In my own case I spent about an hour one night practicing imaginary exposures of varying lengths with the aid of a loud-ticking clock, when the operation soon became easy; and I made all my exposures last year on this plan, whenever there was a suitable sky, without a failure; with the result that last year's negatives are a great advance upon those of previous years.

The line where the shutter cuts off the sky, with lenses of ordinary focal length and a stop not smaller than f32, is well vignetted, and if the shutter is kept in slow motion no trace of a line or abrupt marking is visible on the picture. The shutter is also so light and easily moved that no vibration is perceptible.

If the sky-line is horizontal the shutter is used in its normal position; if inclined, then the shutter is slightly twisted on the lens; whilst an irregular sky-line, if necessary, may be managed

by means of gummed black paper which can be roughly torn to shape and fixed temporarily on the ascending screen of the shutter. The idea is not suitable for very short exposures, but down to 2 seconds a fair degree of accuracy is easy; under 2 seconds may be managed, but with less accuracy; so that for the present purpose an ordinary or slow landscape plate which will allow of an exposure of a few seconds without unduly stopping down is the best plate to use.

It is well to consider carefully the amount of exposure you give to the sky with a view to the effect you desire, as it is easy enough to overdo the difference in proportionate lighting, and to have the sky even too forcible. In case of doubt, and always at first, it is well to duplicate the exposure, giving the same time to the foreground, but different times to the skies. It is also wise to study carefully upon the ground glass the exact effects which different positions of the shutter have upon the distribution of the light; and these effects may vary with different lenses and diaphragms. It may not be a mechanical impossibility to construct a shutter which would carry out the same idea for quick exposures, but it would probably be a complicated machine, and with sensitive plates at our present actinic speeds is hardly wanted.

I suggest the name "compound exposure" as appropriate where different and definite exposures are given to different parts of the sensitive plate.

DIRECT PRINTS WITHOUT THE USE OF A NEGATIVE. . . . .

By W. J. Hickmott, Hartford, Conn.

SOME months since I had occasion to make a series of experiments looking toward the reproduction of manuscript without the attendant expense of making a negative for each print, as in order to be available for the purpose desired the prints had to be produced quickly and cheaply. The only solution of the matter seemed to lie in the production of these prints through the medium of a prism, and through the kindness of Messrs. Bausch & Lomb, of Rochester, N. Y., who kindly loaned me a fine instrument for the purpose, I was enabled

to work the problem out in a very satisfactory manner. I give the result of my labors for the benefit of others who may desire to work on similar lines.

The prism, a four inch, was fitted to the hood of a 16x18 Bausch & Lomb rapid-rectilinear lens, and the whole attached to an 18x22 camera. At right angles to the camera the stand for carrying the object to be reproduced was placed, and the proper size obtained by moving it nearer to or further from the lens, and when the exact size was secured the focus was obtained in the usual way. The object to be reproduced in the case of my experiments was a sheet of manuscript, and great care had to be exercised to get it perfectly centered, and to keep the prism, the manuscript and the ground-glass exactly parallel. It took some time to get everything perfectly adjusted, but when once exactly right and properly fastened any number of copies can be quickly produced.

To hold the manuscript smooth and flat I put a piece of plate glass in a large printing frame, laid the manuscript upon it, and after putting a number of thick pieces of blotting-paper over all, pressed the back of the printing frame into place and fastened down the springs. This held the manuscript entirely smooth and flat, and it was photographed through the plate glass.

Taking a piece of Eastman's Eureka bromide paper, I fastened it to a thin piece of board with flat-headed tacks, and put it into the plate-holder, treating it precisely the same as one would a dry plate. An exposure of four minutes, stop f35, was given, and the image then developed out with oxalate and iron according to the formula sent out with the paper. The result was an exact reproduction of the original, except that instead of being black printing and writing on a white ground, it was white printing and writing on a black ground. I did not find it easy to make strong black and white prints on the Eureka paper, but have no doubt they can be made in the manner indicated by varying the exposure and developer as required.

The experiments made proved that prints of this character, white on a black ground, can be prepared in this way quickly and cheaply by using a prism and throwing the image direct upon sensitive paper in the camera, the only cost being that of the bromide paper. Of course it would have been easy to have made exact copies of the manuscript by first making a negative, but the cost of making an 11x14 negative for each single print, and only

one print being desired from each sheet of the original, precluded their production in that way. By the use of the arc light the exposure could have been shortened, and a good many prints could be made and developed in a day.

The objection raised against the prints was that they were white on a black ground, and it was decided not to produce them in that way; but for records of all sorts, copies of plans, architect's specifications, &c., the process is not only effective but economical.

HOME PORTRAITURE.

By J. Reüel Smith, New York.

THERE is a pleasing little tale, apropos of the vagaries of even the greatest photographic minds, setting forth how Sir Isaac Newton, having had a large hole cut in the door of his dark-room, so that his pet cat might go in and out without disturbing him when he was developing his ideas, immediately ordered a second and smaller hole cut when her first offspring appeared upon the scene.

Photo. by J. R. Smith.

Many readers of the photographic press have doubtless often had this anecdote recalled to them when glancing over some elaborate description of how a very simply obtainable end may be accomplished with great weariness and labor; and perhaps if one set about making an index for such articles, a very large percentage of them would fall under the title "Home portraiture."

The descriptions are so numerous that of course no amateur can recall one hundredth part of them, but every tyro has spent precious hours in devising screens and studying the effects of the window-shade at all sorts of possible and impossible angles, and has his mind filled, like

a used-up roll-holder camera, full of pictures of devices for making a side window give nothing but top light. And yet the oldest house in New York—said to be at 122 William Street—shows that long before the first birthday of Daguerre the architects of Manhattan Island were in the habit of putting a skylight in every house they built, and they have happily continued that very laudable practice down to the present day. So that any one who desires to get a gallery effect need only go to the top floor and, having thrown a thin sheet over the skylight, pose his sitter and do the trick.

A looking-glass makes a good reflector, and a large sheet, half of it pinned against the wall and the other half brought across the hall at right angles—with the lower part pulled forward under the victim—gives a continuous side, back and foreground, and at the same time furnishes the necessary side light.

The accompanying picture, made with a $15 Hawk Eye hand-camera, was so taken in a hall 34 inches wide.

QUARTER PLATE CAMERAS AND THEIR ADVOCATES.

By Frederic G. P. Benson, York, England.

THE advantages of quarter-plate cameras have frequently been dilated on by writers in the photographic press, and there is no gainsaying the fact that in matters of bulk and weight, and cost of working, they compare very favorably with the larger sizes, half and whole plate; but the advocates of small size apparatus are not content with resting their claims for preference on these grounds alone, but proceed to expatiate on the adaptability of small negatives to the purposes of enlarging and the making of lantern-slides by contact; one writer going so far as to say that the small number of prints required by the average amateur can be made by enlargement as speedily and with as little trouble as by contact. Practical experience does not bear out this statement, and it can only be accepted partially in the case of one who has unlimited leisure and the exclusive use of a room where his apparatus can remain fixed up ready for use at all times; otherwise the time occupied in "getting ready" seriously handicaps any one whose available opportuni-

ties for photography are limited to one or two evenings a week and as much of Sunday as his conscience will let him devote to his hobby. Moreover, enlarging practically confines the worker to one class of printing, and in a great measure debars him from having that control over his work which he enjoys when a printing-out process is employed.

That the production of pictures larger than whole plate is more easily accomplished by the enlargement of small negatives than by means of a large camera will be generally admitted, but the same principle does not apply to those cases in which it is the purpose of the operator to make from his quarter-plate negatives prints ranging in size from half to whole plate; the extra trouble of having to enlarge each picture more than counterbalancing the initial saving in cost of materials effected by using the small plate.

The other point which is often held out as a great advantage—that lantern-slides can be so conveniently made from quarter-plate negatives—will be found in actual practice to have very little justification; it is impossible to make a slide by contact from a quarter-plate without sacrificing about an inch and a quarter in length and half an inch or more in depth, resulting in the utter destruction of any pictorial qualities the negative originally possessed, apart from the fact that the shape of the picture so obtained—square or circular—is almost universally deprecated by the best judges. If, on the other hand, a lens is used that will include the required picture in the prescribed space, the negative is rendered useless for making quarter-plate prints, and the margin represents so much waste material. Thus to obtain the most satisfactory results from quarter-plates, it is as necessary to make lantern-slides by reduction as when negatives of larger sizes are used for the purpose.

The employment of small cameras is very often a great convenience, and excellent work can be produced by their aid; but any one who expects by adopting a system of enlarging to make them serve all the purposes of the larger sizes will assuredly be disappointed.

PHOTO BY D. L. ELMENDORF.

SIDE VIEW, NOTRE DAME, PARIS.

PHOTO BY D. L. ELMENDORF.

FRONT VIEW, NOTRE DAME, PARIS.

THE ILLUSTRATION OF NINETEENTH CENTURY INDUSTRIES.

By J. H. Harvey, Melbourne, Australia.

MOST of the readers of the International Annual will remember that two or three years ago there was a "boom" in "photographic surveys" which were calculated to show the natural features of any given district as well as its architectural structures, ornaments and other subjects of interest; and I have often wondered that more attention is not given to the making of sets of photographs illustrating the different industries of the present time.

This work is done in a half-and-half manner now, it is true, but I have come across but few instances in which a really illustrative series of photographs, showing the operations pertaining to any given industry, has been produced.

One of these illustrated coal-mining. It commenced with a map of the district chosen; then followed one or two geological sections showing the seam operated upon, then a "diamond drill" in full work (this drill had been used to test the full extent of the field); next were made in succession views of the mouths of shafts, the entrances to tunnels, two or three views in the underground workings, one of which showed in a very distinct manner a small fault in which a down-throw of about three feet was evident; the whole finishing with a few photographs of modern fern gulleys (the nearest approach to the prolific vegetation said to have existed when the coal-measures were formed), and of fossil ferns, &c. The operation of making coke was also shown, two or three views of "coking ovens" being included, and then the loading and trucking of coal were shown. Lantern-slides were made from these negatives, and the whole series was so well and popularly described that a very interesting hour was spent, the audience at the close of the lecture asking when the next was to be delivered.

The subject was not one of the most attractive nature, and offers very little scope for full illustration by the camera, but by the aid of a good description the attention of a large number of people was riveted from the time mentioned; still, had the lecture been delivered without the photographs it would have proved a rather dull affair to most of those present.

There are scores of other industries which lend themselves much better to this work than the one mentioned above, but it will serve as an example. The iron and brass industries, the manufacture of textile fabrics, wood working, and so on with every branch of the mechanical arts; and as the modes of work of fifty years ago have, in many instances, been to a greater or less extent abandoned, we may anticipate that during the next fifty years very great alterations will be made, and photographs showing the operations of the present time will be of incalculable value, especially if they are taken stereoscopically. What, for instance, would now be given for sketches illustrating the methods adopted by the ancients in the construction of some of their great architectural and engineering works?

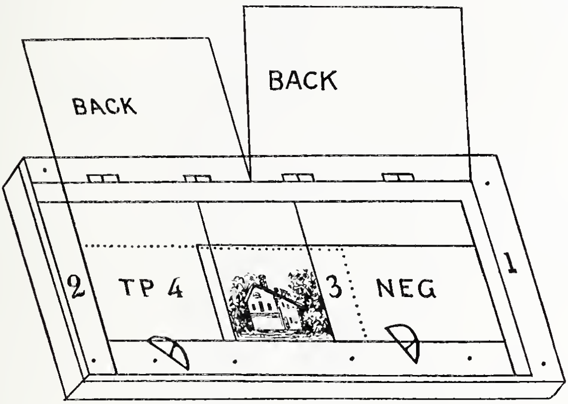
Many amateurs become in time tired of photographing scenery, and they have not the desire (or lack the opportunity) to embrace one or more branches of scientific photography, and to these the system advocated above will give interest to the work of the camera and provide useful and instructive occupation.

STEREOSCOPIC WORK.

By George Kilburn, England.

WITH the revival of the stereoscope many new photographers will have begun to follow in the pursuit of this special hobby. The making of stereograms is much easier now than it was in its first advent. Makers of photographic apparatus have been alive to the requirements of the times and have placed on the market instruments more suitable. Gelatine dry-plates and films have superseded the old collodion so far as ease and certainty of results are concerned, both in regard to the negative as well as the positive. I do not intend to give any instructions in making, or advocate any method or process for producing, the pictures, but rather to describe an improved piece of apparatus of my own construction used for printing either paper prints or positives from the negative. Assuming that we are ready to print from the negatives already secured, and that both pictures have been taken on one plate—no matter what size—the question arises: How are we to make prints or transparencies from them?

The answer is, we must either resort to cutting them with a diamond or glass cutter, or else adopt some means of printing by transposition of the negatives. Cutting the negatives in two I do not recommend, as it is a risky operation to the inexperienced, but I do advise the making of a printing frame, which I will try to describe for the benefit of the readers of this Annual. To make the frame, cut a piece of board 12 in. long, $6\frac{3}{4}$ in. wide and $\frac{3}{8}$ in. thick; cut out an opening in the centre of board $4\frac{1}{4}$x$2\frac{3}{4}$; next cut two pieces $6\frac{3}{4}$x$1\frac{1}{8}$ and two pieces $9\frac{1}{2}$x1 in., all from the same thickness of wood, $\frac{3}{8}$ in. The pieces must measure as stated after being smoothed over. Now fasten the narrow pieces on to the board with glue and a few screws, as shown in drawing. In fixing on



the end pieces insert under each corner a thin bit of wood 1x$\frac{1}{8}$in. to allow for thickness of negatives used, which I will explain further on. The hinged back can be made either in two sections as given in the drawing, or it can be made in one piece if to be used for transparency printing only. In this one no springs are used, nor have I found any necessary, as they are often the cause of negatives being broken. Wood turn-buttons take the place of springs. If the back is made to allow for the thickness of negative and transparency plates, the difference between a transparency plate and a paper print can be met by a pad of cloth between the back and print.

To use the printing frame, put in a negative, say at the right-hand side of frame, push the end under the piece No. 1, in the space allowed for by inserting the thin bits of wood at each corner.

After adjusting the negative over the opening, put over the transparency plate, or paper if such is desired. Bring one end of the plate or paper to the opposite end, No. 2; push it quite flush with the end, fasten the back down, and make the exposure. Unfasten and take out the plate, lay it on the table before you the same way as it lay in the frame, to avoid mistakes; push the negative to the opposite end No. 2, put the transparency plate on again, one end flush with No. 1, and proceed as before. The advantage in using this frame is that by doing as I have stated, accuracy with each picture is secured. It is easy to use and always certain. It can be made to take any sized negative, and is far better than ordinary frames, and only costs a few coppers. It is equally suitable for lantern-slide making. The openings left in each end should be filled up from the outside with a $\frac{1}{4}$ in. strip of wood to prevent light getting in.

AROUND COOPERSTOWN.

By Charles F. Zabriskie, New York.

THOSE who have read Cooper's novels and then visit the little town, named after him, in the expectation of finding anything of the life he describes, will be disappointed. Otsego lake is still here, but the Indian is a thing of the past; deer-hunting is unknown, canoes are a rarity, and the old order of things has vanished forever. But those who come for the beautiful scenery and healthful climate will reap a rich reward. Any country full of lakes and streams must be beautiful, but there is a peculiar charm here which only one who enters into the spirit of it can enjoy to the utmost. Do we desire grand views of high hills and valleys, we have but to ascend any of the heights around, or better still, the Observatory, and the landscape is spread out before us for miles and miles. If we desire the unexpected we have but to drive up Glen Valley, and a short turn of the road suddenly brings up before us the fair valley of the Susquehanna, and a little further on in another direction another valley almost as beautiful. As I am now seeing things with a photographic eye, I shall limit my remarks so as to be of benefit to users of the camera.

One day during the summer just past I was taking some pictures of farm-scenes, when a farmer, as gnarled and picturesque as

PHOTO BY C. F. ZABRISKIE. ENGRAVED BY WEEKS ENGRAVING CO., PHILA.

ON THE SUSQUEHANNA RIVER, COOPERSTOWN, N. Y.

an old apple-tree, stepped up to me and asked that as soon as I had finished my present work I should come to his house and take one or two of his views, grand and distant, that could be seen from his piazza. I tried to explain that while such views were beautiful to the eye they were not as a general thing beautiful on a small piece of paper, that each particular house or hill would be so small as to be almost invisible. He could not understand and went away disappointed. If his views of the scenery around were grand, his views of my ability to photograph were of quite an opposite nature.

But while this region does abound in scenery of vast extent and variety, there are an infinite number of nooks and corners and small bits that are so fair in a small picture. I can call attention to but a few of them. The lover of the beautiful can select for himself almost any kind of beauty that suits his fancy.

Let us commence with the southern end of Otsego Lake, that small portion known as Blackbird Bay. Here, if we adventure in a rowboat and push through the reeds, we come upon a small opening where large trunks of trees, dark with age, rise out of the water, lilies with their large green leaves rest on the surface, and if we push on to a small clump of bushes we can put our camera in position and take some water-scapes that repay us for our trouble. A little further to the south we come to a dock where we find a canoe, fishing-scows, nets, altogether a view different but equally pleasing. Moving along still further we get scenes of dwellings with water and reeds in the foreground and large trees in the distance. And then we reach the docks where the several small steamboats are fastened when not making their trips across the lake. Here is the Natty Bumppo, large and slow but comfortable, and if we go aboard we can sail to the upper end of Otsego Lake and feast our eyes on the scenes along the shores. Just beyond the steamboat-landing is the beginning of the mighty Susquehanna River, and for nearly a mile we pass through scenery almost ideal in its nature. Large trees on both banks arch over the water and form a delightful shade from the heat of the summer sun. Soon we reach the water-works where all the water used in the village is pumped up by large engines. If we ascend the hill just here we behold a large body of water flowing over a dam, a bridge, trees, boats filled with pleasure-parties; sometimes beautiful white clouds come to fill up the bareness of an otherwise blue sky. If we decide to follow the river further on we come to Phœnix Mills. On

one side of the bridge is an old saw-mill and on the other a stone grist-mill long since abandoned. Further on we come to where Oak Creek flows into the river, and here we fairly revel in beauty; the grand trees, the bridge, and sometimes cattle add to the rural scenery. Below is Clintonville, a village quite abandoned. A beautiful grove of trees planted for the factory people brings to mind scenes of former pleasures, when after the day's work was done the people rested in its shade and perhaps had their dances and courtships. But now all is silent. The large mill long since ceased all work, the houses are bare and falling into decay, the river glides on and is of use only to a saw-mill whose roof gapes open and whose saw only occasionally does its necessary work. Below Clintonville we come to Portlandville, a thriving village built on both sides of the river; both of its mills working hard, and signs of activity appearing all around. I have no doubt if we followed the river further along its very winding course we should discover many more beautiful places.

But I consider equally beautiful the scenery along Oak Creek, a small stream that flows from Canadarago or Schuyler Lake until lost in the mighty river. Let us start from its origin and note some of its fairness. Almost at the very beginning we come to a bridge, old house, trees, reeds, rowboats, and we have material for several pictures. Moving on we come to Cat Town. Why it was so named I never could find out, as there are no more cats here than elsewhere. A large mill-pond, with hills and trees on each side, flows over a dam bounded on one side by the usual saw-mill and on the other by the grist-mill, both very old and weather-beaten. Moving down the creek we reach Oakville, and standing on the bridge we see trees and water, cows and barns; or if we turn the other way we see the old stone cotton-mill abandoned and decayed, gradually cracking, and soon to become a mass of ruins. Farther on we reach Fly Creek Mills, though the stream is still Oak Creek. Opposite the saw-mill are the ruins of an old stone grist-mill, struck by lightning and nothing now remaining but the foundations. As we stand on the bridge and gaze down the stream the sunshine appears through the open spaces of what were once windows, the water glistens and sparkles, the trees cast their reflections down below, the boys are in boats gathering water-lilies, and we wonder why there is not a whole row of artists painting such a scene. Next we come to Toddsville, where the scenery is almost equally beautiful. This, like Clintonville, is an abandoned

village. Here is another cotton-mill like that in Oakville, also long disused; the mill-dam is quite broken down; many houses are deserted, and the whole scene is one of melancholy, but also of a charm quite its own. By the bridge is an old wooden house with a balcony bending and falling year by year, so that its disappearance is but a matter of a short time. As I pass this in the evening I almost expect to see the fair Juliet appear, and Romeo standing below singing some love-song. Near this is an old paper-mill almost in ruins. Moving along our creek we arrive at Hope Mills. Here we have no mill-pond, but the mill-race is very long; so long that one day, when I was carrying my large camera and tripod and a bag filled with large plate-holders, I thought I must have walked at least ten or fifteen miles before I reached its source. Very glad was I to reach its junction with the creek, though I groaned as I thought of the return journey, yet was I buoyed up with the knowledge that I had many fine scenes on my plates. At Hope Mills are many ragged children who bothered me at first, as I found them swarming all around my camera, until I discovered a way to utilize them by grouping them in the bare patches of the scenery, where they filled up the otherwise empty spaces of landscape to our mutual satisfaction.

Had I space at my disposal I could enlarge upon the undulating character of the country, where there is not a level piece of ground of any extent for miles around; where all is hill and vale, lake and stream; upon the many hop-yards, with the scenes of hop-picking that take place every August; the wind-mills that are continually whirling around, the small lakes in very high out-of-the-way places, the quaint old cemeteries with the still quainter names on the tombstones, the county fair, the flower parade, the cheese factories, the chicken farms, and other things too numerous to mention. Those who delight in the art of picture-making will find here plenty to satisfy them.

THE SHEET-ANCHOR OF THE AMATEUR.

By Eli Hirst, Cleckheaton, England.

IT seems to me that unless the interest of the amateur is anchored on the artistic side or the scientific side of photography, his zeal will diminish and his camera ultimately become useless. Under these two heads may be classed practically all the successful students of the art-science. There are those, of course, who prefer to "make their hobbies pay," and looking first and foremost for a financial return upon their initial outlay, take at once to portraiture and go about caricaturing their sitters with a landscape lens, injuring the profession by doing work at little more than original cost, and bringing no credit upon themselves or lasting satisfaction to their patrons. But these are not worthy of consideration. If a man buys a camera with the idea of making money out of it, he is not entitled to be regarded as an amateur photographer, but rather as an amateur speculator, and he might as well invest his money in some other undertaking which will yield him a bigger return and do no injustice to others.

Portraiture does not come within the scope of the amateur photographer, and should be left to the professional who possesses the enormous advantages of a studio and its accessories, and who is acquainted with the mystic art of retouching. Outside portraiture there is a fertile and inexhaustible field in which the amateur can attain to success if he will only devote himself heart and soul to the work. There are those who do this—in fact their name is legion—and they mainly divide themselves into two great classes. There are those who for years have been dabbling in chemical formulæ, playing with test tubes and making up emulsions, and who have scarcely a print to show; and there are those who care not by what process the results are obtained so long as they are able to compile an album of prints which have some artistic merit and which, being things of beauty, are joys forever. I am one of those who look for results, and, while not claiming to be an artistic critic, follow photography for the mere love of the art, and endeavor, at all events, to adhere to the elementary principles of composition and lighting. Though not an artist, I take a deep interest in the artistic side of photography. It does not "pay," but it affords abundant pleasure which money cannot buy. One gets tired of

merely taking "views," and comes after a few years' practice to look for "pictures." There are readier means of filling a basket with fish than setting out with a hook and line, and there are readier means of filling an album with prints than going out for a day's photography with a camera and three or four plates; but an angler can appreciate the excitement and pleasure of playing a single fish for an indefinite period, and the true photographer wants no higher pleasure than working on one subject until the best result has been obtained. It is not often necessary to go far away from home to get pleasing effects. Under proper conditions a single exposure on a single subject will be more gratifying in the long run than a dozen second or third-rate prints knocked off in the course of a day's hurried excursion amongst photographic "lions" which have been previously done to death. The one would be a *picture*; the other, prints of no abiding interest.

Let the amateur photographer ally himself with one of these two great branches of the art instead of hankering after the bawbees which his camera can earn him, or indiscriminately pressing the button and sending out his films or plates to be developed through fear of soiling his fingers; and the "results" will be beneficial all round.

SOME SNAP-SHOTS IN THE CATSKILLS.

By Mrs. Cyril H. Burdett, Brooklyn, N. Y.

IN the summer of '93 I decided to spend my vacation at the little village of W—— in the midst of the Catskill Mountains. With a light heart, and a trunk so heavy with photographic paraphernalia that the truckmen groaned as they passed it along, I started on my journey. The sun was setting behind the western mountains as the train stopped at a small railway station, whence the trip was to be continued by stage. The dark masses of the mountains rose up in bold outlines against the brilliant background of the setting sun. A hush pervaded the atmosphere, and voices sounded strange and unnatural. During the long stage ride the light gradually faded, and the twinkling stars one by one peeped forth in the gathering darkness. Nearer and nearer the mountains approached, until, like huge black spectres, they towered on either side, the road

winding between them like a narrow thread. We were in the "Notch," and a damp chilliness crept over us, while the darkness was profound. We soon reached the welcome farmhouse, however, whose twinkling lights gleamed forth in the valley below. The locality promised to be full of picturesque and interesting subjects to photograph.

The first few days after arrival were dreary and dismal. A steady downpour of rain filled every little brook and streamlet in the village. Torrents poured down from the mountains, through fields, over fences, across roads and under conduits, leaping and foaming in a mad rush onward. In front of the main hotel of the village the road was submerged under two feet of water. Teams and pedestrians were obliged to ford in order to proceed on their way. The falling rain and the mist quite obscured the distant mountains and made the light gloomy—conditions not favorable for snap-shot pictures. But by wading into the water a short distance a good position was obtained from a convenient rock, and a rift in the clouds lightening the scene a trifle, the exposure was made as a horse and wagon were struggling through the waters. This picture illustrates the inconveniences of a rainy spell in a mountain village.

The following days were bright and beautiful, but the streams were still swollen by the heavy rains, and on every side many picturesque views abounded. Nearby was a bridge spanning a river, with the foaming waters rushing over the rocks below in many little cascades and whirlpools. I was obliged to balance myself on a rock several feet from the shore to obtain a good view, but this was accomplished without accident. A picture of the rapids above the bridge was also taken. The color of the water unfortunately could not be reproduced. It was a rich coffee-and-cream color, due to the soil, which, during the storm, had been stirred up and carried along by the rushing waters. Some distance along the road there was an old log cabin, empty, deserted and desolate—the outworn shell of some past occupant. What history was bound up within its walls! What tales of joy and sorrow had once been breathed by its generations of long-silent dwellers! Fast going to decay, it served now only as a reminder of the life that had departed.

A group of calves in a neighboring field proved an interesting subject. They objected, however, to being photographed, but after a half-hour or more of persistent manœuvring they were induced

to approach within taking distance of each other, the foremost assuming a defiant expression, as much as to say that he only submitted to such impertinence under protest. As I am naturally timid about facing cows when unprotected by a fence, this picture was taken with great trepidation.

A farmer approaching with a team of oxen gave me another interesting subject. He stopped under a big tree in front of his door-yard, and was delighted to have his picture taken, just as he was, with his wife who came running out to join him. The group was photographed, but, upon developing this plate, I found the oxen's heads were very large while their bodies diminished quite rapidly, and the farmer and his wife, in the background, were reduced to insignificance: all because I had neglected to keep in mind the laws of perspective when selecting the point of view.

Photo. by Mrs. Burdett.

One day I met a flock of sheep on their way to market. They were driven by a countryman in rough attire, while a dog ran here and there and kept the stray ones in the road. A cloud of dust preceded the flock. The leaders, hesitating at the sight of a camera, turned to one side as if afraid. At this moment the button was pressed. As the sheep passed by the driver remarked, with the drawl of a rustic, "Wall, I'm mighty glad I warn't in that ere picter!"

On another occasion I visited Devasego Falls, which were a few miles distant. An immense volume of water came thundering down a rocky declivity some twenty-five or thirty feet in height, while the spray and foam dashed high at its foot. The water had hollowed its way out of the solid rock in a semicircular form, and found its exit in a turn nearly at right angles with its original course. To obtain a picture it was necessary to descend the rocks to the edge of a cliff perhaps twenty feet high, and thence down a rudely-constructed ladder made of branches of trees tied together, covered with moss and dripping with moisture. The ladder was slippery and shook with every step. It was no easy matter to reach the bottom even when unencumbered with a camera, but the difficulties were finally overcome and the picture obtained.

Although the plates exposed during my vacation somewhat exceeded the number of pictures secured, I gained experience which more than repaid for my disappointment at the failures.

THREE PHOTOGRAPHIC HAUNTS IN ENGLAND.

By Digby H. W. Cotes-Preedy, King's Norton, Eng.

Fladbury, Worcestershire.

FLADBURY is situated on the Great Western line between the cathedral city of Worcester and historic Evesham. It is a peaceful haunt on the Avon, full of subjects for an enthusiastic worker of the "black art." Let us enter the church. Signs of old and beautiful architecture can be noticed. The roof is the weakest point in the building. On the north wall of the chancel is a tablet and bust, erected to the memory of Bishop Lloyd, one of the bishops who courageously defied King James II. and his ecclesiastical reforms. A very ancient tomb belonging to the Throckmorton family stands at the west end. If the visitor is fortunate enough to get permission from the Rector to ascend the tower, a splendid view of the surrounding country will be obtained, provided that Jupiter Pluvius does not reign. In the churchyard are some famous and ancient yew trees, which harmonize well with the church on the "mysterious" plate.

Having finished with the church, walk past the station for about three-quarters of a mile till Craycombe Hill is reached, from the

summit of which, looking towards Evesham, a most perfect picture is seen; even lovely enough to satisfy those disgusted with English scenery. The Avon winding between verdant meadows, while on its left bank rise, in their lovely grandeur, the beautiful woods of the Duc d'Aumale, containing many a pheasant. I was fortunate enough to see this exquisite scene in summer; not easily will it fade from my memory. Having followed my directions, no doubt the traveller will be ready for some refreshment and rest. Retrace the path to the village till the "Chequer's Inn" is reached, where all wants of the inner man will find ample supply. When the "forty winks" are over, take a stroll down the bank of the Avon towards the village of Cropthorne. Plenty of work will be met with. I am afraid it will be difficult to choose what to photograph, as the opportunities afforded for making artistic pictures are so numerous.

King's Norton, Worcestershire.

King's Norton is about six miles from the great iron city of Birmingham on the Midland line to Worcester. On account of the first statement some may say that "there cannot be much to see at that place"; I will try and disabuse their minds

The church will, no doubt, on account of its noble appearance, attract the visitor first. The thirteenth century saw the commencement of this fine edifice. It was restored about twenty-five years ago. The interior, by no means less fine than the exterior, is rather dark, but makes a good subject for a lantern slide. The piers and arches of the nave, as well as the windows of the north aisle, consist of the decorated style of architecture which marks the fourteenth century. The oldest part of the church is the east window, which is of the Early English style. A very fine oak reredos and a new east window (stained glass) were lately placed in the chancel while my father (the Rev. Digby H. Cotes-Preedy) was Vicar. A few plates can be well expended on interesting subjects inside the sacred building; for instance, at the west end is an old monument of a recumbent knight together with his wife. On the north wall is a slab bearing the following curious lines:

> "Th' Ascention day on the ninth of May,
> Third yeare of King James' raigne,
> To end my time and steal my coyn,
> I, William Greves was slain."—1605.

William Greves was a tax-collector and was murdered for his money.

Before leaving the church, its steeple, a noble work of the perpendicular style (15th century), must be noticed. The historian Leland, in the time of Henry VIII., mentions it as a "goodly pyramis of stone over the bell frames." The exterior of the church may be taken from many spots in the churchyard and from the village green. In the churchyard stands an ancient timber-framed building with mullioned and traceried windows, lately restored, founded by Edward VI. Adjoining the churchyard and village is another building "of old-time," in which Henrietta Maria, wife of Charles I., slept, July, 1643. About a mile from the village, lonely, stands Hawkesley House, besieged during the Civil War. Many pretty landscape pictures can be procured, the neighborhood being excellent for a photographer.

Wootten Wawen, Warwickshire.

Wootten Wawen is a pretty little village near Henley-in-Arden; it also lies on the road from Birmingham to Stratford-on-Avon. The church is one of the oldest in the country; it was, so I believe, an old abbey church in the good old days of Merry England. The church is divided into a lady-chapel and a part which is generally used for divine service. There are some old monuments which are well worth a plate. Perhaps it would be of interest if it was known that there are some old chain bibles of bygone years. The exterior makes a pretty picture. The church has been built upon a hill, which greatly adds to its beauty. At the foot of the hill is a moderately large pond; get the church reflected in the water on a fine day and a most charming picture ought to be the result. The surrounding country is pretty, especially Ullenhall, to which a visitor to Wootten Wawen must certainly go. Perhaps it would be useful if I mention that the "Bull's Head" is a good place to put up if desiring to stay a day or two.

If the above lines are of any use to my fellow-workers in the art of photography I shall be fully repaid for any slight trouble which they may have caused.

THE SIMPLIFICATION OF "PRINTING-OUT" EMULSION CALCULATIONS. . . .

COMPILED BY MILTON B. PUNNETT, JENNINGS, MO.

	Symbol.	Condition.	Equivalent Weights.	Wt. $AgNO_3$ required to convert 1 part salt or acid.	Wt. of salt or acid required to convert 1 part $AgNO_3$.
Hydrochloric Acid....	HCl	gas	36.5	4.658	.215
Ammonium Chloride ..	NH_4Cl	dry	53.5	3.177	.315
Barium " ..	$BaCl_2$	$2H_2O$	122	1.393	.718
Cadmium " ..	$CdCl_2$	dry	91.5	1.858	.538
" " ..	"	$2H_2O$	109.5	1.553	.644
Calcium " ..	$CaCl_2$	fused	50.5	3.366	.297
Lithium " ..	$LiCl$	dry	42.5	4.000	.250
Magnesium " ..	$MgCl_2$	fused	47.5	3.579	.280
" " ..	"	$6H_2O$	101.5	1.675	.597
Potassium " ..	KCl	dry	74.5	2.282	.438
Sodium " ..	$NaCl$	"	58.5	2.906	.344
Strontium " ..	$SrCl_2$	"	79.25	2.145	.466
" " ..	"	$6H_2O$	133.25	1.276	.784
Zinc " ..	$ZnCl_2$	fused	68	2.500	.400

ORGANIC ACIDS AND SALTS.

Acetic Acid	$HC_2H_3O_2$	glacial	60	2.833	.353
Sodium Acetate... ...	$NaC_2H_3O_2$	$3H_2O$	136	1.250	.800
" "	"	fused	82	2.073	483
Citric Acid...........	$H_3C_6H_5O_7$	$1H_2O$	70	2.429	.412
Potassium Citrate. ...	$K_3C_6H_5O_7$	dry	102	1.667	.600
Sodium "	$Na_3C_6H_5O_7$	"	86	1.977	.506
Oxalic Acid	$H_2C_2O_4$	$2H_2O$	63	2.698	.371
Potassium Oxalate	$K_2C_2O_4$	dry	83	2.048	.488
Tartaric Acid.........	$H_2C_4H_4O_6$	"	75	2.267	.441
Sodium Potas. Tartrate. (Rochelle Salts.)	$KNaC_4H_4O_6$	$4H_2O$	141	1.206	.829

REMARKS.

This table is to be used in the same manner as "Ackland's Table No. 1." When information similar to that given in Ackland's table No. 2 is required it can be obtained from the above table as follows:

We wish to substitute in a formula potassium citrate for 15 grains ammonium chloride; how much potassium citrate shall we take? From the "equivalent weight" column we find that 53.5 parts ammonium chloride are equal in replacing power to 102 parts potassium citrate; then

$$53.5 : 102 \text{ as } 15 : x$$

$$\frac{102 \times 15}{53.5} = x = 28.6 \text{ grains potas. citrate.}$$

In the case of an organic acid, if there is no base present to neutralize the nitric acid radical of the silver nitrate, no reaction takes place.

HALF-TONE NEGATIVE MAKING.

By A. H. Calderwood, Albany, N. Y.

THERE is no doubt but that the most important consideration in the making of a half-tone plate is a good negative, one that is right in every respect. A poor etcher may make a very creditable plate, providing he has a correct negative; but the best etcher in the world could never succeed in making a good plate from a poor negative, one that is not right in any particular.

You ask what constitutes a good negative. I answer, one in which the dots in the high-lights are just nicely knit together at the corners, and where the deepest shadows are clear glass. Understand, the deepest shadows. Some operators argue that we should penetrate the deepest shadows and work to secure a fine firm dot in these places by clearing. To prove the fallacy: Expose a plate (without the screen) on a landscape, for example, giving sufficient exposure to get a deposit in the deep shadows. In development you find you have a gray, flat negative with no color and no modulation. Note the difference in one exposed just right,

ENGRAVED BY T. VAFIADIS, CONSTANTINOPLE, TURKEY.

A TURKISH VENICE.

in which the shadows are represented by clear glass. The highest lights are fully as intense, and all the varying shades have their proper relation to each other.

It is just this way in the making of a half-tone negative. If over-timed (and when you expose a sufficient length of time to get a dot in the deepest shadows you over-time), the result is a very gray negative which no amount of clearing will remedy.

Some young operators have an idea that it is necessary for them to plug up the high-lights in the negative quite tight or else the etching will be low in tone. Now, in a photograph or wash-drawing there are parts which are just a shade or two lower than the extremest high-light, and of course if you close the high-light you raise these in proportion, and the resulting proof is white and chalky. Keep the dots well open, and the etcher, if he knows his business, will put in the high-lights.

The size and shape of the dot, as well as the separation between screen and sensitive plate, play a very important part. Most operators have discarded the round stop entirely, and are using various shapes, such as square, rhomboidal and oblong, these aiding very much in bringing together the corners of the dots in the high-lights.

Here is a good rule to remember in the making of negatives. Expose just long enough to get a faint trace of dot in the shadows, using the largest stop that will just nicely bring together the corners in the high-lights. I use the words "faint trace" and "just bring together," as above, advisedly, for the intensification will work a wonderful change.

Just one more thought. My experience in developing has been that when the image flashes up immediately the developer is poured on the plate, you can make up your mind that the exposure is too long, and the plate might best be thrown in the sink and another and shorter exposure made.

The best negatives are obtained when the exposure has been such that it is necessary to prolong development possibly a minute or two and it is not necessary to have to hustle to wash off the developer.

PHOTOGRAPHY AND MOUNTAIN CLIMBING.

BY MATTHEW SURFACE, ENGLAND.

"Hills draw like heaven,
And stronger sometimes, holding out their hands
To pull you from the vile flats up to them."

THE practice of mountain-climbing is becoming very popular in Great Britain, and by this I do not mean the mere act of ascending mountains for the sake of what may be seen from the top. The climbing referred to is undertaken on its own account. It would be somewhat difficult to explain to one who has never experienced any of the peculiarities of climbing, wherein its great attractions lie. Only those who have been imbued, at least to a moderate extent, with the enthusiasm which the pursuit awakens, can understand the joy of bringing one's energy, both mental and physical, to bear on the overcoming of difficulties which present themselves in going up an "arête" or in conquering a "chimney." It is like a very good game at chess, but still better, because in Nature's chess-board every square is different, and one never knows beforehand the exact form the game will take.

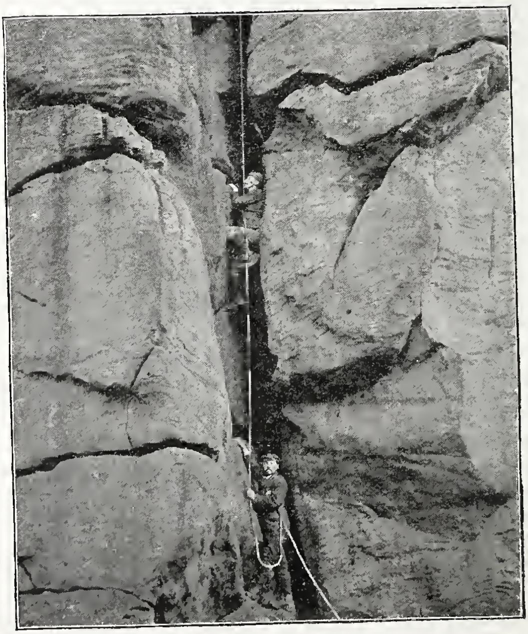


Photo. by M. Surface.

A CHIMNEY.

There are many varieties of climbing, but roughly they may be divided into two heads, snow climbing and rock climbing. Each of these requires skill of particular kind. In the first a man must be able to use the ice-ax to cut steps in snow or ice, must have a general knowledge of snow-craft, understand

when the snow is likely to be in good condition and when not, must be able to find his way amongst thousands of crevasses, and capable of tackling a "bergschrund" with ability and confidence. In rock-climbing the qualifications are mostly of the gymnastic order; where it is often a necessity to depend upon the hands alone for support, the muscles of the arm must of course be well developed. Above all, in climbing one must have good nerves, and he who cannot look over the brink of a precipice unmoved had better stay on flat ground.

Photo. by M. Surface.

A SNOW GULLY.

In Great Britain snow-climbing can only be obtained in the winter months, usually from January to March or April. Of course, even then there are no glaciers, and the difficulties to be overcome are not on the same scale as in mountainous countries like Switzerland or Norway. Still, on a smaller scale, the English lake country mountains in winter bear a marvelous similarity to the Alps, and they are much used as a practicing-ground by members of the Alpine Club and others who are preparing themselves for bigger climbs abroad in the summer.

The rock-climber will find abundant scope in the Lake country mountains at any time of the year. Of course, as these mountains do not exceed, excepting in two or three instances, 3,000 feet, the climbs are comparatively short, but they offer precisely the same difficulties that present themselves in the Alps. The only difference it that whereas to go up a steep arête or a couloir in England may

take a couple of hours, in Switzerland three times as long would be required. People are often puzzled to know why mountaineers select the most difficult way up a mountain rather than the easiest. Where there are no difficulties there is nothing for the climber to do; where there are most difficulties his sport is at its height. When one comes to go into it, it is remarkable how few inaccessible places there are. It may be urged by some that climbing is dangerous. So it is under certain circumstances, but it must be borne in mind that when men go out to deliberately face a certain danger the occasions are rare when they do not overcome it. It is the unexpected which produces an accident. I have no hesitation in saying that there are more dangers in street life, and far more accidents, than in the most difficult climbing achievements. It is rare that one hears of an accident, and when this is the case it is usually found to be due to some outside cause, and often the result of carelessness—the case of inexperienced persons venturing where they ought not to go.

Photo. by M. Surface.

AN AWKWARD CORNER.

All this is, however, beside my subject, which is more particularly about photography in connection with climbing. Just as in every sport, pastime or sphere of life, it is pleasing to be able to make a permanent pictorial record; so in climbing, permanent photographic records are valuable for reference, or as reminiscences afterwards. The difficulty of carrying a camera is one of the

PHOTO BY DAVIS AND SANFORD. CLIMAX PLATE.

WHAT SHALL I SAY?

greatest drawbacks to photography on the mountains. Usually the climber has sufficient to do to carry himself. It therefore follows that the lighter the apparatus the better. The most convenient camera is the hand pattern with a reservoir of plates attached. To open out an ordinary bellows camera, fix it on its tripod and insert the slide, is an operation taking too much time on such occasions, apart from the mere trouble of carrying the weight. At the same time a light camera stand is often useful, because in dark gullies it is not always possible to give an instantaneous exposure, and it rarely happens that a piece of rock can be found at a suitable angle to rest the camera on. A convenient form of tripod is the alpenstock pattern, which is easily carried or suspended to the wrist by a sling when actually climbing. When not in use the hand-camera is easily put away into the rück-sack, a particular form of knapsack which all Alpine men use, and with which at least three times the amount of luggage which an ordinary knapsack admits of can be comfortably carried.

Photo. by M. Surface.

THE NAPES NEEDLE.

It is to be regretted that many of our greatest climbers have not given any attention to photography. Mr. Mummery, who has recently published a book on his climbs, has borrowed the photographs with which it is illustrated from his friends, and while they are very good as photographs they do not really illustrate the book from a climber's point of view. Mr. Whymper, whose book on the Andes has become classic, was entirely without a camera, and,

though an excellent draughtsman, his work loses much in lacking the faithful representations of photography. Mr. W. M. Conway, in his recently issued book on the Himalayas, tells how he exposed over a thousand negatives, but that a great many were spoilt, and although he could have availed himself of the remaining negatives to illustrate the book, he has not one direct reproduction. The illustrations are all from wash drawings by McCormick, and although clever enough from an artist's point of view, they lack the detail which to a mountain climber affords the most interesting and valuable evidence as to the exact construction of rocks. Some of our younger school of climbers, we are glad to say, are taking up photography in connection with their hobby. Among these may be mentioned Mr. Howard Priestman, a few of whose photographs appeared in "The Practical Photographer" for February, 1894, and Mr. Ellis Carr. The late Mr. Donkin, who so unfortunately lost his life in the Caucasus, was an ardent climbing photographer, and his photographs are among the best which can yet be obtained. An Italian professional photographer, Mr. Luigi Cella, is also doing much good work in this line.

Photo. by M. Surface.

IN THE CUMBERLAND MOUNTAINS.

A question which may be asked is, are these Alpine photographs much use? We answer they are. To the geologist, as showing the structure of mountain chains, they have great value. To the

meteorologist, photographs taken at high altitudes showing clouds of different classes, are worth much. They excite admiration and marvel in the mind of any one, while to the climber they have a deeper interest. Some wonderful records of sunrise, storms approaching, and also effects of light and shade have been produced. Owing to the remarkably rapid changes of weather which take place, and the frequency of bad weather in all mountainous countries, the photographing of mountain scenery is attended with considerable difficulty; one may carry a camera for days and yet never get a suitable opportunity for a single exposure.

DRY.

By Abraham Bogardus, Brooklyn, N. Y.

A GENTLEMAN of acknowledged intelligence said he had tried to get interested in photographic literature but found it very dry. I told him the dry plate was in universal use, yet that was no reason why photography's literature should be dry. There was too much theory written, and not enough practical knowledge disseminated by some of the photographic publications. "Personal experience is a better teacher than theory." Too often we see long articles containing many words with but few ideas. A matter that could have been told in twenty lines is stretched out into several columns. It reminds me of the ranchman who was on his way home as darkness came on. A thunderstorm came with the darkness. As there was no shelter near, he could only picket his horse, wrap himself in his slicker (oil coat) and stand and take it. The lightning was feeble, but the thunder tremendous; the lightning was so little that he could not see where he was, while the thunder kept a continued rolling. He thought he must pray. He had not been used to praying much and hardly knew what to say. He said, "Good Lord, if it is all the same to you, I wish you would give me more light and less noise." If some writers would give readers more ideas and less words they would suit the demand of the times much better.

I have no desire to be a critic; it would not be a pleasant occupation to search for other's faults. I had rather seek out the good, the high, the worthy. As an example of multiplying words without knowledge, I notice it is becoming a habit to criticise severely

all pictures of children, or, as the critic states it, "the failure of operators to produce childlike pictures of children." If a critic writes with intent of making the artist do better, it is well; but when he writes merely to find fault, or probably to show his self-claimed superior wisdom, it is a bird of very different plumage. They find fault with everything except their own illustrations as to how posing should be done. Their attempts are seldom criticised, as they are not worth the time or ink. The fact is, and it can be proved, thousands of children's pictures are made in which the background is not too prominent—where the pose is not rigid or unchildlike—where unsuitable accessories are not introduced, and where the result is a thing of beauty and joy to every person of taste. This is proved by the beautiful pictures embellishing the various photographic publications, as well as by visiting the better galleries of our cities. Of course a chronic fault-finder will pick flaws in any and everything. Make the picture as you will, he will insist that it should have been made in some other way. The opinions of such critics have little weight with practical men who know their business. The experienced operator sees all the critic sees, knows all and more than the critic knows; he also knows why he was obliged to do this or omit that, and is aware that some things cannot be done on all occasions, with all subjects. Neither do I agree with the idea that unkempt children make the best pictures; that is a matter of taste. To some eyes the crow may be a prettier bird than the golden pheasant, but, in this country where we go by majorities, I should "pool" on the G. P. A richly-dressed child will always make the better picture. However well or handsomely posed, the rich dress, the flowing hair, the intelligent face, make up the beauty of the picture. Many pictures of children are not attractive because the parents cannot afford to dress them well, or are devoid of taste in dressing them. The parents dress the child, and not the operator; he is obliged to take them as they are presented.

It would be amusing to see one of these fault-finding critics undertake to pose a child, plainly or scantily dressed, expecting to make a pleasing picture. It would be as good as a circus to stand by and see his aimless antics; he would probably use up several handkerchiefs in wiping the perspiration that oozed from every pore, fall on the nearest chair from sheer exhaustion, give up the attempt in hopeless despair, go home and write "how not to do it."

To make photographic literature interesting to the general public, let practical men of long experience with "all sorts and conditions of men," women and children, write their daily, yearly, or, if you please, life-long experience. Such a narrative would out-trilby Trilby in interest, enable us "to see ourselves as others see us," and give to posterity a correct record of the tastes, vanities, whims, pride and fashions of "this now our day."

WHY SHOULD ARTISTS AND PHOTOGRAPHERS DISAGREE? . . . .

By H. W. Studley, Rockland, Mass.

AS I do a little painting and also dabble in photography, it seems to me sometimes that the photograph is a direct help to the painter, especially if he is of the pattern who would like to progress. How a photographer could look at a fine painting done by a master-hand and not see the touch of merit or feel within him some desire to search out the finest feeling of that artist, is to me inexplicable. On the other hand, the artist who can gaze upon a beautiful picture, well handled from beginning to end, by an artist photographer, one who understands every turn of his calling from an educated point of view, and not at the same time feel that he (the photographer) really deserves to be noticed and accredited with a likewise amount of praise, he also must study at random. In my mind I conceive the idea that the artist is just as liable to make mistakes in perspective, which decides the rights and wrongs of the foreshortening of parts of his productions, as is the photographer in getting too near and producing distortions by too much magnifying.

Sharp but friendly criticism leads many a man to the right position in his calling, whereas an amount of unjust judgment delivered in ever so small quantities will bring not a few to an unhappy state of mind.

I have not the least desire to speak discouragingly of either merits or demerits concerning the two crafts, but it has been the subject of much discussion which of the two deserves to bear off the palm regarding correctness of representation. My amateur opinion is that photography, as most of us have seen, represents things as

they actually appear in nature, barring out the distortions named above. Again, while the artist has perhaps the benefit of drawing and painting things more for the actual pleasing of the eye that has been trained for just such effects, not regarding the fact that just such changes do not always exist in nature, the artist retouches his canvas as he sees it represent art in portions that have failed to convey his choice of beauty. The photographer retouches his negative not to please himself but to please the untaught customer, who would never take the picture if the natural character, consisting of wrinkles, warts and moth patches, were not stopped out by the cunning device of the lead pencil.

I would suggest that photography and painting, as nearly as is consistent, be united, in order to assist each other in every respective branch that could be brought to bear upon all the fine arts by interchange of thoughts and practical endeavors; all pointing to the same result—the strong brotherly feeling for the success of both branches of the trade.

It is quite often the case that the critic does not understand the aim of the artist, and he crowds on his description of the painting or photograph to suit himself, and people of enlightened minds, who love to read, take the whole of it in, although they have never seen the work or the critic at all. Their decision is quick, that man's work, in their eyes, will never hold a place, whether it be painting or photograph.

So long as the world shall stand, painting and photography will, until something better is invented, take the lead in many ways, and they both should go hand-in-hand for the sure prosperity of both. Millions in this world can testify to the good and comfort they have received from the two sciences. Let both crafts progress, as there is no earthly end to the perfection that each one can be carried.

PHOTOGRAPHY AND ILLUSTRATION.

By W. D. Farrington, Brooklyn, N. Y.

In volume six of the International Annual of Photography I attempted to show the value of photography for illustrating purposes, and hinted that there are more ways than one in which the camera can be made a source of profit as well as pleasure. The chief of these is as an art-tool for securing illustrations for publications. The value of the camera in this connection has been recognized in all branches of art and trade, opening the way, as it does, to the creation of artistic pictures, not otherwise possible except to the favored few who possess sufficient manual skill with brush or pencil to transfer a picture to paper.

The camera in the hands of the amateur desirous of utilizing his art becomes a tool instead of a mere toy. A hasty classification of amateur photographers would divide them into three kinds: Those who make pictures for home consumption only; those who have sufficiently applied themselves to their art to be able to produce pictures sufficiently good for exhibition or lantern slide purposes; and, lastly, those who have become semi-professionals and make photographs to sell as illustrations for some published article.

Besides the knowledge of the chemical part of photography, there are certain rules of art to be learned which pertain more particularly to illustrating. These in themselves are simple and apparently self-evident, but from this very simplicity they seem to be the more frequently overlooked. The first of these rules is, that every picture should tell a story. Not necessarily a story in the same meaning of the word as applied to paintings or statuary, but a story in the "news" sense, that is, a relation of facts or circumstances of interest to the outside world. When you have secured such a story, pictorially or otherwise, be sure that you have the material for an illustration of value; a value which is directly proportioned to the interest such a story will create in the public. Modern newspapers and magazines are anxious to pay the full value of this kind of news, more particularly so when adequately illustrated. The universal education of the people now-a-days furnishes a growing market for good literature which is apparently far in excess of the supply.

Never in the history of journalism has the pictorial art played so important a part as at the present time, and no paper or magazine is complete without illustrations.

To the knowing, the work of the lens is plainly visible, the camera being the basis of all that is new and beautiful in the art of reproducing pictures. The photogravure, the line plate, the Mosstype, and a dozen other systems, all depend on photography for their reproductions; but more than all, every editor depends, for the suitable illustrating of the current events treated in his journal, upon the camera as the quickest, most reliable and cheapest form of pictures.

The field for illustration is large and constantly growing. With the camera each contributor is in great measure his own illustrator, and simple pictures, when they tell a story, are as valuable as the best letterpress. A fine negative will always command a good price from the publisher.

No one can expect to find his pictures ready-made even in a landscape. The good illustration is a combination of all the circumstances which make up an important fact. It must be built up in the mind's eye before it is brought into focus. Do not be in a hurry; map out your picture carefully and get the best out of every negative. The greatest difficulty is to get your picture at the moment when events have so shaped themselves that the picture tells the whole story. This can only be done by genius or by exposing a number of negatives. The latter is the rule followed by most illustrators.

Have the picture mean something. It must show individuality and purpose, to be good, and simplicity is a mark of great wisdom.

A certain amount of technical accuracy is absolutely necessary. The illustrator is entirely the servant of local conditions; he cannot choose his own light or time of exposure, and this must be overcome by increased accuracy and ability to overcome defects by chemical manipulation. The weather is not always favorable, and exceptional care must be taken in studiously aiming the camera and timing the exposure.

All this applies with equal force to all good photographs, but there are a few rules particularly applicable to photographs intended for reproduction which must be studiously observed. First and foremost the picture must present strong contrasts of light and shade, the tendency of the reproduction process being to soften the lines, and a picture that is all grays or blacks or whites will produce a plate so indistinct as to be worthless. The picture must be centralized. A concentration of the rays of light is necessary to make the picture. The lights and shadows should be so ar-

ranged that the eye is irresistibly drawn to the primary object which it is desired to illustrate, otherwise the attention will be so distracted by a multitude of minor objects that the value of the whole is ruined. As a corollary to this the necessity of singleness of conception is to be noticed. Every good illustration is made up of its subject and a number of auxiliaries. This subject must be made prominent at the expense of the minor matters by which it is surrounded. A mistake of too frequent occurrence, which should be carefully avoided, is the allowing of lines, such as of fences or trees, to cut across the face of the picture at right angles with the line of sight. All lines should run into the picture, if possible, in direct agreement with the laws of perspective. Any thing that cuts the picture from side to side necessarily divides it into two parts, neither of which is a complete picture, yet which cannot be joined together on account of the prominence of the dividing line.

Foregrounds of conventional shapes, such as fences or railroad tracks, should be carefully avoided, and indeed all formula figures should be left out of every picture as far as possible. Architectural and mechanical subjects are the only ones that profit by straight lines and right angles. So in grouping, formalism is fatal to artistic results and must be avoided at all costs.

Developing plates that are intended for use as material for reproduction does not differ from any other class of work except that it is necessary to bring out all details in order that the contrast already mentioned may be secured. This contrast and detail may then be secured by printing the photograph a trifle darker than is the custom in commercial photography. In the print it is necessary to have the blacks of a warm black color, not a blue black, as a blue will give a grayish black in the reproduction. On the other hand care must be taken not to print down the white portions, but to allow them to remain as brilliant as possible in order that the high lights of the reproduction may be sharp and clear.

Art editors of the best magazines express themselves in favor of the platinum prints, for the reason that the surface of these admits of retouching by an artist with Chinese white and India ink. In this way deficiencies may be supplied or faults corrected, and the most artistic results are obtained. Bromide prints are hard in character and are not favorably regarded.

If the prints are to be sent to the journal unmounted and by mail, it is usually thought desirable that they should be on some mat

surface paper, otherwise the highly burnished surfaces will crack into innumerable small geometrical figures, rendering it almost impossible to get a good reproduction, the light striking these surfaces unevenly. However, if mounted when first made they should be burnished and sent that way, the faces carefully protected.

Just what size of photograph is best for reproduction is a question to which no adequate answer has ever been made. It all depends on the size of the illustration, although this does not alone determine the question. The best results, it is claimed, are secured from pictures twice the size of the desired illustration. This is so because retouchings and irregularities are thus made less prominent. If the picture be too large it loses in the reproduction by the crowding together of the details. If it be so small as to require enlarging its defects are magnified, the grain of the paper becomes marked, and any manipulations of the print are painfully apparent. Small prints, however, have this advantage, they may be enlarged and retouched by an artist and then reduced in such a manner that the retouching is not noticeable. This is the method pursued by quite a number of reporters and news correspondents who are obliged to economize in the space allowed for a camera, and who, moreover, are often obliged to work under adverse conditions. Seldom in the excitement of a boat-race or a riot is there time to obtain careful, accurate photographs. The opportunity must be caught at its critical point. By this system of enlarging, retouching and again reducing, many of the defects of their hasty work are concealed, and really good pictures of an important moment in history are presented to the public.

The one great objection to this method is that a picture suffers from a number of photographic manipulations—the fewer the better.

The experience of every art editor and journalistic illustrator has taught him that there is a certain desirable quality necessary in a picture that can only be secured by experience on the part of the photographer. This is not to be explained, but every photographer who turns his attention to illustrating will soon learn it.

A good picture, with plenty of contrast, that illustrates a good newsy story, is the one thing that is of value in illustrated journalism, daily, weekly or monthly.

A LITTLE TOO MUCH ART.

By H. T. Duffield, New York Camera Club.

IN these latter days, Art (with a very large capital A) has invaded the regions of photography and is turning things quite topsy-turvy. In bygone times a photograph was judged by its sharpness to the edges of the plate, by its correctness as a truthful representation of the subject, and by the manipulation of the negative and the print; but these ways have become of the past, and the picture is passed on as regards its carrying out the "canons of art"—the said canons, owing to the rapid growth of new schools of painting, beginning to be as extensive as are the creeds of the different religious denominations in this country—of which there are more kinds than there are varieties of pie. The photographer of to-day is like unto a man in a maze, surrounded by barriers of sets of art canons (each differing), and is groping around the illy-lighted paths trying to find his way out. If he turns this way he is stopped by the rules of the "old school," that way by the successor to the pre-Raphaelite, then again by the impressionists, and so on. The poor fellow is all tangled up and does not know what to do; some laws say he must have accessories to his figure, and others say he mustn't, and he feels like tearing his hair and crying aloud in anguish, "What in thunder is a feller to do, b'gosh!"

The truth of the matter is that we are now having just a little too much of the painter's canons of art, which are well enough in their way when used by the free mind and free hand of the painter, and therefore can be carried out by him; but photography is a very different affair from painting and cannot be made subservient to these canons. In the first place the photographer is not the master of his art, for he is working with instruments over which he has only half-control. First of all, there is the light, often very difficult to manage; then there is his lens, which sometimes he must humor; then the temperature, the weather, the purity and strength of his chemicals, the condition of his printing paper, and so forth—any one of which can make or mar his picture. Take the matter of lighting the subject. In the studio he meets with difficulties every day; the passing clouds, the rain, fog, too brilliant sunlight—all of which tell upon his work. And so it is in view work, when often a change will take place in the lighting of the subject, perhaps almost nullifying the effect the photographer seeks to secure.

When the difficulties of this half-mastership of his instruments are considered, it must be realized that the photographer's work cannot and should not be judged by the same rules as is the work of the painter, who has under control of mind and hand his paints and brushes. The materials are different, and the art of using them different, and it is not just to make comparisons. That there should be art in photography should not be denied, but it must be according to canons of its own, and not according to those governing the working in other materials. Take for instance the making of portraits; the photographer has to work in a room lighted in a certain manner, and therefore giving limited facilities for posing his subject; the person whose likeness is being taken must stand or sit in a place where the face is properly lighted, for we go to the photographer's to have our likenesses truthfully taken (as far as our vanity will allow), and not to be made artistic pictures of, and this the photographer understands, or he would do no business. He cannot afford to make artistic pictures of his customers if they do not want them, and this condition of affairs must be taken into consideration when his work is judged, and the likeness should not be tossed aside by the art critic with the sneering remark of being "conventional." It is true many photographers get into a rut and take all their subjects in a few positions, but before criticising his work should we not ask, "Is he not doing what his customers want him to do—giving them truthful likenesses of themselves and using all of his resources, even though his posing may be conventional?" If this is so, the artistic qualities of his work must be judged by his intentions, and not by the canons of another art. So with view work. The outdoor photographer has been taught that the line of the horizon must be above or below the middle of the picture, and what is the result of following this canon? Usually a plate of two-thirds of blankness which is supposed to represent the sky, for he must not get in too much foreground. Far better would it be to disregard this canon and have acres of grassy meadow than to have miles of nothing, for the foreground would show that something at least had been photographed. It is all very well to talk about printing in clouds, but it is another thing to do it; at least the work of the average amateur shows it to be so. "Cut down the picture" is told us, which is all very well, but it grates upon our artistic feelings to paste in our albums a strip of a picture eight

FROM COPYRIGHTED PHOTO BY HASTINGS.

ENGRAVED BY ELECTRO-LIGHT ENGRAVING CO.

"Maurine! Maurine! 'Tis ten o'clock! Arise,
My pretty sluggard! Open those dark eyes
And see where yonder sun is. Do you know
I made my toilet just four hours ago?"

or ten inches long by two or three inches wide. An aged colored aunty once remarked to a little white boy, '" Why, sonny, niggers has feelings as well as white folks," and the immature amateur sometimes has artistic feelings as well as the painter grounded in art at Paris or Munich.

The art of photography, though in its infancy, has made great strides, and has a great future before it. What it will become no man can tell, for the writer firmly believes that it will be no distant day before science will solve the problem of photographing in colors, and then photography will have its own school of art; but there is no reason why we should wait until that day before promulgating canons of art to govern the photographer. Why cannot we drop all the rules, excepting the fundamental ones, which are to be followed by workers in other materials, and evolve our own, based upon the use of the instruments we employ? The writer has read books written by photographers grounded in the rules laid down to guide painters in oil, sculptors, etc., but they do not meet the requirements of the photographer. What is wanted is a school of art in photography based on its science and art, and not on what another person must do when handling other materials. Anyhow, just now we are getting too much of other people's art.

HASTINGS AND ST. LEONARDS.

By Joseph Chamberlain, Tunbridge Wells, England.

THE ancient town of Hastings, which is one of the principal of the Cinque Ports, is about sixty-four miles from London, and situated near the eastern extremity of the county of Sussex. There are few localities that are so rich and fruitful as the neighborhood of Hastings and St. Leonards in the matter of antiquarian and historical research, or as work for the camerist, whether he goes in for landscape, architectural, genre or seascape work, and when the district is left, it is with a desire to return, if possible, in the near future. With regard to health seekers, the severity of our winters causes the sheltered position of both Hastings and St. Leonards to be much sought after during that time, as it is so well protected by the hills from the north and east winds; the soil, which is dry sand-rock, is warm, and the in-

valid may enjoy in his chair a fine promenade from the old town up to the Queen's Hotel, where he will be secure and sheltered from the cold winds by the Fairlight-down, which is nearly 350 feet above the level of the sea; and it has been noted that the number of days on which an invalid may enjoy an outing amounts to about 330, certainly a large portion of the year for this variable climate of ours. Hastings was a town of importance during the Saxon rule, as it possessed a mint, A. D. 924, in the reign of Athelstane, which we are told flourished down to the time of William II. (Rufus); it has associations which bring us back to the time when the Saxon king (Harold) was defeated by William, Duke of Normandy, who had landed an army of 60,000 men in the bay of Pevensey. This occurred in the year 1066, and a good many of these military events are recorded in a wonderful manner by, I believe, the Bayeux Tapestry. The town was for several hundred years famous for its shipbuilding, and up to the time of Elizabeth was governed by a Bailiff, but in the year 1588 it received a charter of incorporation from Queen Bess; it also appears that members of Parliament were elected and a Court of Sessions held in the reign of Charles II. Some remnants of walls still remain, which shows that at one time it was fortified, and the large pieces of timber and fragments of stone point out the remains of where the wooden pier once stood which formed the harbor, and was destroyed about three hundred years ago; some say it was burnt by the French and Spanish ships, and we are also told that the French and Dutch ships made a combined attack on the town in 1691, and in the tower of St. Clement's Church are preserved two cannon-balls embedded in the masonry. This church was supposed to have been rebuilt in the 14th century on the site of an older one. In the year 1806 Major-General Wellesley, afterwards Duke of Wellington, commanded a body of 12,000 men who were quartered in the neighborhood; the population at that time did not exceed 3,500, and now with St. Leonards it is about 60,000. The towns are open to the sea along the entire length; the terraces and parades, which are composed of noble houses, give an unbroken promenade of three miles along the shore, and about midway, at the end of the grand parade, stands an archway which marked the boundary of the two towns, but now, since their amalgamation, is not required for that purpose. There is splendid hotel accommodation, most of which is lighted with the electric light, and every convenience for visitors; there is a good

service of fast trains run between London and Hastings daily; passengers can also be booked to and from all the principal towns in the kingdom. The chief attraction is the castle. This appears to have been built in Saxon times, as William the Conqueror is supposed to have added to its dimensions and strength. It stands on the edge of a high, irregular cliff, its walls presenting an almost impregnable front to the sea; they are about eight feet thick, composed of flint and stone, but decaying very fast. It was excavated some years ago by the Earl of Chichester, which brought to view the church, an arch of which still remains in good preservation, the chapter house, castle mount and the entire line of east wall with a semicircular tower and towered gateway. Coins and a great many antiquarian relics were found. The view from here is grand; as to the East Hill, the old town is seen in the valley below with the fish-market, and looking out towards the sea, near the beach will be seen the fishing-boats and yachts, whilst daily may be seen large numbers of ships going up and down the Channel. The piers stand out prominently, and beyond St. Leonards will be seen Pevensey Bay, and quite in the distance will be seen Eastbourne and Beachy Head, whilst nearer in is Bexhill. Near the castle are the St. Clement's caves, which are supposed to have been the haunts and hiding-place of smugglers who deposited their goods here; they are reported to extend over 3 acres, and should be visited. In the old town is All Saints Church, a perpendicular structure, and has a very fine east window, and here Titus Oates was baptized in 1619. As the visitor comes from the station he will see the Albert Memorial, erected in memory of the late Prince Consort; not far from the cricket ground, which is close by, will be found the entrance to the Alexandra Park, and through lovely scenery, where there are lakes, lawn-tennis grounds, croquet lawns, a walk of half an hour will bring one to Bohemia; the whole has been laid out in the most exquisite way, making it a most charming park, and the carriage drive adding much to the pleasure of those who cannot walk. The Gensing Gardens, which are in a high state of cultivation, and the St. Leonards Gardens, where will be found choice and rare specimens of shrubs. I have seen very large fuschias a great many years old growing there, and according to tradition, a large block of stone which was used by William the Conqueror as his breakfast-table. The town possesses a theatre and opera house. The School of Science and Art and lecture hall were the gift of Lord Brassey, who will be much

missed during his stay in the Antipodes. Battle will be one of the first places to which the visitor will make his way. This is distant about 7 miles; this may be reached by any of the conveyances leaving the Albert Memorial on Tuesdays, or by one of the numerous trains. The town derives its name from the battle fought between the Duke of Normandy and King Harold; the former made a vow that if victorious he would found a free monastery for the salvation of all who fell, and it was in consequence of this the Abbey was erected on the exact spot where the Saxon king and his standard were borne to the ground. Amongst the privileges with which William richly endowed it was the right to hold its own court. It was exempt from all episcopal jurisdiction; the Abbot could refuse to deliver up any criminals who had taken shelter within its walls, and the Abbots held very fast to all their privileges. The King placed his sword and robe worn at his coronation on the high altar. The monastery was suppressed by Henry VIII., after which Sir Anthony Browne became possessed of it and converted some part of it into a dwelling-house. In 1857 the late Duke of Cleveland purchased it and resided during part of the year, up to his demise. The entrance, gateways and towers are wonderfully good, being embattled; this fronts the London road, and is 54 feet high and about 35 feet square, and has an octagonal turret about 8 feet higher at each angle; this is supposed to have been built at the time the Abbey was enclosed and fortified in the reign of Edward III. by Abbot Retlynge; the great chamber over the gateway is supposed to have been the justice hall; a Norman window and rubble masonry may be seen in the west wall of the court-gate. Inside we find the Abbot's lodge, which measures 58 ft. by 31 ft. wide and about 57 ft. high. There is still the dais and music gallery, and several suits of armor, one reputed to have belonged to a Duke of Bavaria, and another to Henry, son of James I. Northward of this is the Abbot's solar; what is now the drawing-room has been decorated and gilded. The guest-house is of the 11th century, and stands over a fine example of Early English cellarage. The great Cloister Garth forms a square of 122 ft. by 100 ft.; the dormitory runs north and south on the east side, the refectory on the south and the minster on the north; the west side had the apartments with cellarage below. The splendid crypt has considerable remains of an altar; several gravestones have been discovered. Here was preserved the Battle Abbey roll, which was a list of all those who

PHOTO BY LANDY. ENGRAVED BY PROCESS ETCHING AND ENGRAVING CO.

SWEETNESS.

came over with William. Not far from the Abbey stands the church of St. Mary, founded between 1107 and 1124; it is principally Early English, and was founded by the Abbot of that time; the square Norman tower, which is embattled, is 70 ft. high. In the chancel is a white marble altar monument to Sir Anthony Browne and his wife; the figure is clad in armor and decorated with the marble collar and other insigna of the Order of the Garter; there are also several brasses and mural tablets, one in particular in the north aisle is to the memory of Edward Cartwright, the inventor of the power loom. A short walk from Battle brings one to Normanhurst, the palatial seat of Lord Brassey, on a spot which overlooks the Channel for a great many miles east and west, and is itself conspicuous from the sea, with its octagonal tower and stone spire. The buildings, which are dressed with Portland stone, are constructed with a hard blue stone procured locally; these grounds, as also Battle Abbey, are thrown open to the public on Tuesdays. The noble mansion of Ashburnham Place, about 5 miles from Battle, the seat of the Earl of Ashburnham, is built of red brick, and in the mansion are some interesting relics of Charles I.—the sheet in which his body was wrapped, the shirt in which he was beheaded, his watch and his silk drawers. About 3 miles northeast of Battle is the village of Sedlescomb, a preceptory existed here of Knights Templar; the church is of the Early English style, has several mural monuments, and has a font with a remarkable cover. A short walk through charming country brings one to Bodiam, which is on the river Rother; this may also be reached by rail to Robertsbridge, and a walk of a few minutes brings us to that fine old ruin, "Bodiam Castle," which was built by Sir Edward Dalyngrudge, who was possessed of the manor through his wife Elizabeth Bodyam, after his return from Cressy and Poictiers; it is in the form of a parallelogram, with four round towers at the angles and four square ones between them, and is surrounded by a moat, now nearly covered with water-lilies. Three escutcheons of arms over the entrance-gate show the possessors of the manor to have been Bodyam, Dalyngrudge and Wardeux; the entrance was defended by a portcullis, the square towers by which the great gateway is flanked being machiolated, and in the vaulted passage are traces of a second and third portcullis. The sallyport under the southern tower has funnel-shaped perforations through which the defenders poured melted lead on the assailants; the main walls are about seven feet thick. The roof of the main

building has a "louvre" which carried off the smoke from the fire which was made on the raised hearth so common in ancient castles; it is said to be one of the finest moated castles in England. To the camerist who is a fair walker, a start over the East Hill, Hastings, to Ecclesbourne Glen should be made, where the charming scenery all around will delight him, the highest point being about 250 feet above the level of the sea; the valley which lies between the two hills has inspired many an artist. By crossing the valley and ascending the hill to the east, a short walk will bring the pedestrian to Fairlight Glen, and he will be well repaid for his exertions, and will regret the want of more plates to expose on the lovely scenery. He will soon come across the Dripping Well, which lies in a quiet spot, and is the attraction, especially if there is a fair flow of water, which gently pours over the rocks covered with moss and trickles away down the glen. On skirting the edge of the rocks towards the sea will be found the "Lovers' Seat," which has a good deal of romance attached to it, and from which a magnificent view may be had of the sea. One of the finest views of land and sea is to be had on Fairlight down, which is one of the highest points in Sussex, and on a clear summer evening can be seen the British Channel for a distance of 80 miles from Beachy Head to the South Foreland, and sometimes Boulogne and the white cliffs of Calais may be seen; natives have said that 66 churches, 10 towns, 70 martello towers, 40 windmills, besides 5 castles can be seen. Winchelsea and Rye will give plenty of work for the camera, both places being within easy railway distance of Hastings, from whence the former is about nine miles; the ancient town stood about 3 miles from the present, but in consequence of several severe storms in the 13th century the town was completely destroyed. Edward I. laid out the new town, which was surrounded by a massive stone wall, and the entrance to the town being guarded with gates; the traveler proceeding from the railway passes through the Land-gate, which is also known as the Ferry gate; it is supposed to have been built in 1404, as a shield on it has the arms of the mayor in 1405. The New Gate is about ½ a mile, on the southwest side, from the church; the most perfect is the Strand gate leading to Rye, this has a round tower at each angle. The remains of the fine old church, which must have been a very imposing and splendid structure, and which was dedicated to St. Thomas the Apostle, and was built about 1290, consist only of the choir and chancel, with some portions of the

transepts. The building was originally cruciform, and consisted of a nave, side aisles, north and south transepts and a central spire; the recent restoration brought to light the piscina and the sedilia, the sacristy, and at the northeast angle is a fine massive flying buttress; there is a vaulted crypt beneath the chancel. The monuments in the aisle of the choir of splendid workmanship should be examined, they are of the early part of the 14th century, and in the choir is a slab dated on the margin "le XV d'April l'an mccclii." On the west side of the churchyard stands an old ash-tree, under which it is said John Wesley preached his last sermon in the open air. Close by will be found the Friars, near the site of what was a Franciscan monastery; the choir of the old chapel is worth examining, the fine arch at the west end and the choir which terminates in an apse; it is open to view on Mondays. There is a Town Hall which has a gaol underneath, and is at the northeast side of the churchyard. Passing through the Strand gate will be seen Camber Castle in the low-lying marshy ground, and though dismantled early in the seventeenth century it still gives one an idea of what it once was, but I am afraid it will be rather disappointing as it has no special architectural features, but it should be visited. A walk of 1½ miles will bring one to Rye. This also is an ancient town, about 12 miles from Hastings; the harbor is formed by the rivers Rother, Brede and Tillingham, uniting at the southeast corner of the rock on which the town stands. Rye was originally guarded by five gates, but the only one now remaining is the Land gate, which is a noble structure 50 feet high with lofty massive towers. The church, which was erected in the 12th century, is cruciform; two very handsome Anglo-Norman arches separate the north and south aisles of the nave from the transept, it was restored in 1883 when many of the unsightly erections were removed; the clock has a pendulum 18 ft. in length coming down through the ceiling, and is said to be the oldest clock actually at work, it was supposed to have been taken from one of the vessels of the Spanish Armada and presented to the church by Queen Elizabeth; there is also a very handsome mahogany chest; some flying buttresses at the east end are worthy of notice. The Ypres Tower should not be forgotten; this stands on the edge of a steep cliff at the southeast corner of the town, and was erected between 1135 and 1154, and has been used as a fortress off and on since that time; in the gardens attached Queen Elizabeth had guns mounted, from whence it took the name of the Gun-garden. The north gable

of the oldest house in Rye is to be seen on the south side of the churchyard, it is supposed to have been of a religious edifice belonging to the Carmelite friars. The town once boasted of a mint. An old house in Mermaid Street is worth a visit; amongst the many rooms in the house is one ornamented with a carved wainscot, and also has a fine chimney-piece of Caen stone engraved with a quantity of roses, the Roman numerals showing it was put up in the time of the Tudors; an old monastic building on the east side of Conduit Hill has a very handsone window-frame with a pointed arch supported by corbels. Plenty of work can also be found for the camera in the harbor, as vessels of 200 tons and upwards come up to the Quay. I must not omit to mention there are several other buildings which show by the roses carved on them that they belonged to the same age, and the following lines in a guide-book seem very appropriate:

> In these old houses we may somewhat find
> Worthy remembrance by the thoughtful mind;
> E'en those vast beams, they show in time of yore
> What mighty oaks the neighboring forests bore;
> These roses, too, so rudely graven here,
> Sad tales may tell of many a bloody year;
> The white rose crimsoned with man's heart-blood shed,
> The crimson blushing with a deeper red;
> While there their union, carved on that old door,
> Speaks peace restored, the bloody conflict o'er.

The penning of these few lines and a cursory glance at the photos secured whilst visiting these places has awakened very pleasant memories, which I trust may fall to the lot of any one traversing the same ground.

THE DIFFICULTIES OF PHOTOGRAPHING IN NATURAL COLORS. . . . . . .

By Jabez Boothroyd, Bolton, England.

MUCH has been said and written on photographing in natural colors; I have carefully considered all that has come under my notice, and thus far I must confess that I cannot see that we are any nearer the solution of this most difficult problem.

Ever since the idea of photographing in natural colors had its birth, the efforts to attain that object have, in my opinion, been in the wrong direction and based on false premises. Indeed I may say there has been no foundation at all upon which to rear the superstructure. To my mind it has been very much like the Irishman who said that he could build a house without erecting scaffolding, and to do so he would begin at the top and finish at the bottom.

If we stand before a mirror we shall see what appears to be the delineation of ourselves in all the colors and varied tints with which we are adorned, but it is only an appearance—a mere shadow of our material bodies. It is this shadow with all its apparent colors that we are trying to fix upon the sensitive film by means of the optical instrument, the camera. Surely then this attempting to grasp a shadow and trying to nail its colors to the mast, if seriously considered, must appear quite as ridiculous as the Irishman commencing to build a house from the top.

All natural phenomena are the result of the operation of infinite power upon universal matter manifested by what are called the natural forces—light, heat, electricity, attraction, etc.

Photography is a natural phenomenon, and the natural force, light, one of the manifestations of infinite power, is the agent that produces the effect called photography, which term means light-writing. I think it is not generally known that light has no effect upon a sensitive plate if placed in a vacuum (yet such I believe is the fact), and if the vacuum was large enough the plate would be in darkness, as there would be no gaseous atmosphere for the force, light, to illuminate, the force, light, being invisible. Outside our atmosphere is a dark, black expanse that light cannot illuminate, and what is called the blue sky is the color of the atmosphere made visible by the black expanse around it.

Light, I again state, is invisible, and the atmosphere which light illuminates is also invisible, yet it is the effect of that illumination which enables us to see all the other effects that light produces upon matter, the most important of which to the photographer is the effect of color. Color being only an effect, cannot be a cause of other effects, as the effect cannot be a cause. How then can we fix that which is only an image of the colors of the objects that we wish to photograph upon the sensitive film, this image being only a shadow? It is the force, light, that is reflected from the objects

photographed that affects the sensitive film, and according to the intensity of the light will be the impression made on the film.

I cannot but think that all who have attempted to photograph in natural colors have failed to grasp what color is, or they would have started from different premises than what they have. There is only one foundation upon which any theory can be firmly established, and that foundation is, that there is only one power, and that power is infinite. All the effects that the human eye can see and the human mind can perceive are being produced upon universal matter, are produced by that one great infinite power, and this infinite power is made manifest to the finite human mind through or by means of the natural forces—light, heat, electricity, attraction, etc.

Color is an effect produced by the reflection or refraction of light, and according to the angle of reflection or refraction will be each particular color. The colors of the rainbow are produced by the reflection of light from the globular drops of rain; and the colors of the spectrum are produced by the refraction of light through a glass prism. The rays of light which are reflected from the objects to be photographed are all converged to one point called the focus by means of the photographic lens, which lens is a prism or prisms of circular form, ground to certain particular curved forms so as to converge all the rays of light to one point, and thus present the effect of color by the convergence.

If, then, the globular drops of rain so reflect light as to present all the prismatic colors to our vision, what is it that is instrumental in the different natural objects of presenting to our vision the infinite variety of natural colors? Can it be other than such a variety of forms of atoms and arranged in such order as to reflect light in the different angles necessary to present those natural colors to our vision which the natural objects do display? If so, then I think if we are ever to solve the problem of photographing in natural colors, we shall have to proceed on different lines from what has hitherto been pursued, as that of trying to fix the reflected image of the natural colors.

If natural objects require the different forms of atoms necessary to reflect light in the different angles necessary to present to our vision all the natural colors (and I think they do), then we shall have to infuse into the sensitive film, somehow or other, those different forms of atoms, and so manipulate them that they may reflect the light in the same form and in the same tints as the

different natural objects reflect the light. Such I believe are the difficulties to be overcome before we shall be able to photograph in natural colors.

USEFUL HINTS.

By Silas Gurney, Clinton, Mass.

WHAT to say and how to say it so that it will be instructive and entertaining is for me a very difficult task, unless I tell how I fixed a graduate, the bottom of which was broken off. I procured a collar to a lamp, inserted the broken end of graduate into the small opening of the collar, turned it upside down and filled the collar with plaster of Paris. After it had set, my graduate was as useful as ever.

I develop my plates with eikonogen and hydroquinone, and this is the way I make my developer:

No. 1.

Sulphite of soda	1½ oz.
Water	18 oz.
Eikonogen	¼ oz.
Hydroquinone	¼ oz.

No. 2.

Carbonate of potash	4 oz.
Water	37½ oz.

To make, dissolve sulphite of soda in 8 oz. of hot water; when dissolved, add eikonogen and hydroquinone, then add 10 oz. of cold water. To use, take No. 1, 3 oz.; No. 2, 1 oz. If you have given your plates good exposure add 3 or 4 oz. of water. Instantaneous exposures use full strength.

I send you a photo of a cat with two heads. I made one exposure while the cat was looking out of window. The click of the shutter attracted her attention; the cat looked toward me and I made the second exposure; this is the result. It was taken in a house while sitting upon a table looking out of a window. Also one of a cock that was brought into my studio. I placed him on

a post, but he felt inclined to jump down and shows it in the position. Another of a little boy who would not let me pose him, but took the position himself and I pressed the button. How do you like it?

I make my paste thus: Take as much water as paste needed, stir in any good starch till it is creamy, not too thick, and place over a lamp or fire. Stir constantly until it begins to thicken, but not boil, then remove and stir until a nice smooth white paste is obtained. Squeeze through a cloth and it is ready for use. Let it cool before straining.

THE DEVELOPMENT OF THE INTENSITY OF NEGATIVES. . . . .

By P. C. Duchochois, New York City.

AT what stage of the development should the action be stopped to obtain a negative sufficiently intense? Such is the query which lately I have been often asked to answer. It is said that, as a rule, the development is far enough pushed when the high lights are apparent at the back of the film and the deep shadows slightly veiled. If the film is of a medium thickness this rule is generally reliable, but if the film is thick, the opacity will be exaggerated and harsh prints be the result. Again, if the developing solution is energetic, the reduction, instead of gradually extending in the film, is, so to say, localized on the surface, which commences to be veiled *in toto* before the reduction is effected in the subjacent parts of the film, and if, then, one pushes the development until the high lights of the image appear at the back of the film, the result is necessarily a very intense negative yielding white and black prints. Hence, the appearance of the negative image, from which one can judge the intensity, changes with the thickness of the film and also, principally, with the reductive energy of the developing solution.

It is evident, therefore, that in ordinary circumstances the best manner of operating is to prepare an energetic developer and to slacken its action by diluting it. For, a diluted solution, acting slowly on the surface of the impressed film, extends its action into it gradually, and consequently causes the image to appear on the back of the film when the intensity is very nearly correct in the

high lights and the deep shadows not veiled to an objectionable extent.

By thus operating, the development is of course slow, but this is greatly compensated by its being entirely under the control of the operator, who not only obtains the intensity, but can, as the case may be, force out the details by the addition of the alkali, or strengthen the contrasts by increasing the dose of pyrogallol and adding a certain quantity of the restraining bromide solution.

In concluding I advise one not to exaggerate the intensity. It is better to intensify than to reduce it; for by the latter operation the delicate details in the shadows are dissolved, i. e., destroyed. As to the intensifying process, I recommend the following, which is not liable to stain the picture, giving for portraits and landscapes all the desirable intensity, provided, however, enough silver has been reduced:

The negative, well washed, etc., to eliminate the hypo, is bleached by mercuric chloride, then rinsed, immersed in water for a few minutes, then again rinsed and finally treated until blackened through by the following solution:

Water	1000
Cryst. sodium sulphite	15
Hydroquinone	5

PROOFS AND RESITTINGS.

By G. H. Loomis, Newtonville, Mass.

"UNTIL you are satisfied" is the suave and comforting assurance and reassurance of the proprietor and poser, and so the patron takes his or her or its seat before the camera and the experiment commences. Two exposures are made on one or two plates, affording front and side views, and the sitter is dismissed for this time, or until proofs are made and mailed for inspection. The home circle and intimate friends are called for consultation, and the hearing is often severe and aggravating. Why did you and why didn't you wear this, that and the other dress and trimmings? and where on earth did you get that expression and that unusual style of hair arrangement? The council adjourns subject to a review of the second

What other improvements may be wrought out by the inventive ingenuity of the coming craftsman we do not know, but one thing is certain, marvels are yet to occur—under the sun—not less astonishing than those we have witnessed in the past.

THE PURSUIT OF PHOTOGRAPHY.

By W. J. Haskell, Buffalo, N. Y.

THE course of true love never ran more smoothly than my first efforts with the camera. Comparatively few failures, many pictures worthy of notice, the result of careful, cautious and conscientious reading and operating, left an impression that I was fairly competent to enlarge my experience by trying other localities differing in many respects as to quality of light and nature of surroundings. When this opportunity for change arrives, the painstaking amateur plans his course according to his knowledge, and ordinarily will, in asking the advice of his betters, as to the use of his camera under the changed conditions, receive a renewed sense of novelty, much the same as he had in his earlier experiences.

How well I remember my first attempt to produce a good seascape! Acting upon the advice of a professional friend, I reduced stops and time about one-third and sallied forth in pastures new. I tramped over rocks and sand, through shady lanes, along dusty highways, through forests of pine, across fields where drowsy kine gave the best of views for rural scenes, but I spurned all these distracting temptations and sought only marine views. So I tramped on, reveling in the beauties about me, yet not losing sight of my ultimate objective; joyously sailing the sea of hope, carried lightly on by the mental view of the three dozen negatives with which I was to feast the envious eyes of my brother friends, six hundred miles away. Confident that our combined knowledge was sufficient to warrant it, I exposed my whole stock of plates and then went some five miles or more to use the dark-room of a professional friend. Imagine, if you can, the emotion, the eager anticipation that filled me while preparing developer, and placing the bromide where it could be readily used on over-exposures, and then the

TRILBY CRITICS.

placing of the first plate in the tray, and careful flowing of developer, the minute inspection for air bubbles, &c., &c. Here we draw the veil and pass over the ensuing scenes without comment. Some dark-rooms are isolated by thick walls from all outside disturbing sounds. It is well that it is so.

The artist (whose kindness I appreciated more highly after subsequent action upon his advice) tried to console me for the failures by remarking in a compassionate manner that nearly all amateurs made similar mistakes, and that I did not differ much from the others. This was a blow below the belt and I succumbed—took his advice to use my own judgment in further trials, and doing so, met with as good results as one could wish for.

We are often told that there is a limit to all things, but if some one could designate a limit to the field of work for the camera I would like to have it done. I am often at a loss which to take and what to leave. Let me tell what presents itself to the eye as I sit here writing this informal letter to you.

The near foreground of my seascape is a broken range of granite bluff dropping somewhat abruptly as it recedes to the middle distance, and resting at the foot in a gentle slope of surf-beaten sand, still gradually receding to where the surf, breaking, leaves the swash to form a dividing line nearly parallel to the horizon.

To the right and left the eye ranges past the rocks, where lurk in shadows the deep purples, browns and greens; thence over undulating ranges of sand-dunes whose dazzling whiteness the eye hastens to leave, then beyond and above the middle distance the broad, restful, refreshing expanse of old Atlantic; then on to meet at the horizon with the beauties of cloudland, there to revel in Nature's most lavish display of material for the imagination to work upon. Hence the field far exceeds in scope of picture-producing effects all the old, old stories of castles and armies and the endless creatures of the mind pictured in the glowing coals of the fireplace of the days of our grandsires; towering cliffs, rolling dunes, the restless sea, are repeated in the blue vault above us. There is no limit to the possibilities in this picture.

However, I am but mortal, wishing at all times to preserve by appropriation as much of the beauty around me as I can. Much can be retained in memory, but the new and greater help to the memory is found in the camera, and although I am far from being an

accomplished artist with the instrument, some degree of success has followed my efforts in that line.

While general field work in almost any locality offers a wide range of subjects, it is observable that most of us, sooner or later, tire of our advantages, great as they may be to the close student, and we unwillingly feel a sameness in the subjects and long for a change, even though feeling a sense of shame that we have not the patience and courage to fully master the subjects at hand and find new beauties and possibilities in old scenes.

While cloudland offers most enticing and interesting views to the eye, it is a difficult and discouraging line of work, at least so far as I have tried to secure any special effect. Some negatives I have secured are more the result of chance than design, and I will be truthful by saying that the sum of my retained knowledge as to their production is that I used a medium stop and short exposure. I would not be understood as having made no good cloud negatives, but that I have secured but few illustrative of any particular natural phenomenon.

Any of the views which you may select from those I send you will be self-explanatory in nearly every respect to the student, although the subjects being seaside marines or selected from adjacent scenery, may from some particular feature in each prompt some inquiry as to the conditions under which they were taken, &c. I usually do all my ordinary field work with stop 32, time $\frac{1}{25}$ to $\frac{1}{5}$ second, using a 5x7 plate, Taylor, Taylor and Hobson Rapid Rectilinear lens, fitted with a Bausch & Lomb automatic shutter with iris diaphragm.

It goes without saying that I vary diaphragm and time under circumstances requiring it. I used a comprehensive expression in the above statement and would not like the reader to think I was too rigid in my rules; by the way, for the beginner it might be well to say here that as a general rule I expose to suit my developer, the latter being made of uniform strength, and only varied when absolutely necessary.

For the accompanying road scenes I did not vary stops or time from ordinary work at home. For the marines, sand-dunes and clouds I used stop 16 and time about $\frac{1}{40}$ to $\frac{1}{50}$. These exposures gave the results noted by using normal pyro; the negatives required only from three to five minutes for full density. Some of the views of the sand-dunes were taken on Carbutt's slowest plates, with stop 32, time $\frac{1}{2}$ to 1 second, and gave most excellent results

as to distinctness and density, though, perhaps, for more pleasing effect they might have been a trifle softer; that, however, depends upon the person whose taste and judgment is sought and could have been effected by using a weaker developer.

TRIMMING AND CUTTING.

By A. L. Eidemiller, Minneapolis, Minn.

IN these days of cut sizes of paper, anything written on this subject may seem to some a little behind the times, but with the exception of cabinet work, nearly all prints must be trimmed, even now.

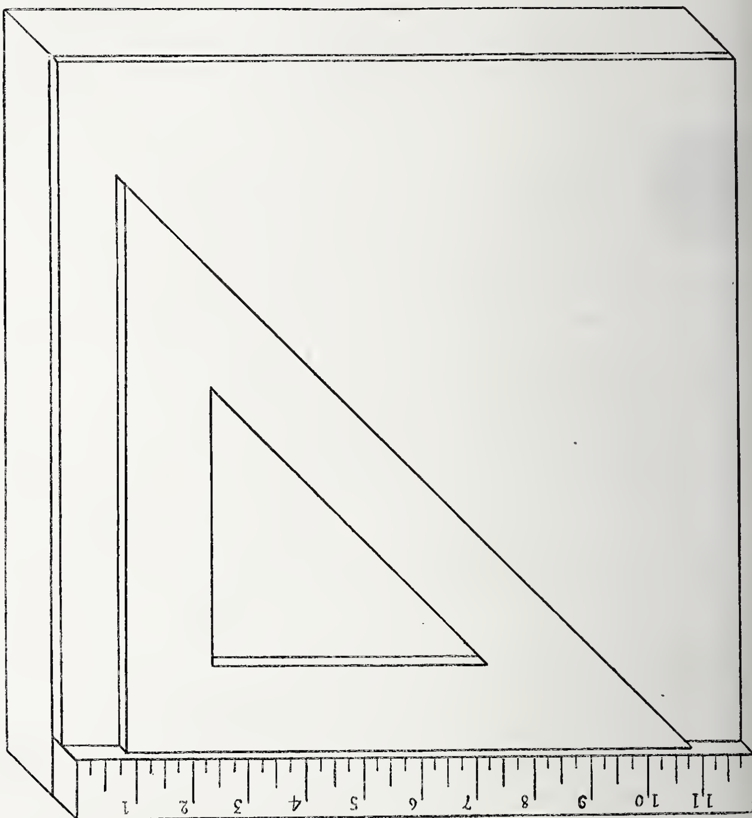
The old-fashioned way was to use a glass form just the exact size of the required print and trim around the edges. The objections to this plan are that a form is required for every size print turned out, but the most serious evil is that the prints are cut to fit the form regardless of any improvement that could be made artistically by trimming to smaller proportions.

An arrangement without these objections is easily made and has the merit of being cheap. Take a piece of three-quarter inch hard wood twelve inches wide by thirteen inches long. Across one end screw a strip one inch wide and a quarter inch thick, and graduate it in inches and fractions. Then screw on the board a piece of thick zinc twelve inches square. The zinc used by photo-engravers is the proper thing. This is the working table; as a guide for the knife get a ten-inch 45° draughtsman's triangle. The rubber ones are best for this purpose. Any kind of knife can be used, but the best is made by cutting a triangular piece off the

point of a shoe-knife and grinding the edge where the cut was made.

The apparatus is now complete and the method of using it is very simple. The first two edges of the print can be cut by using the right angle of the triangle as a guide, then place one of the trimmed edges against the graduated stop, place the triangle on

the print and cut down the right-hand side; the remaining edge is done in the same manner. A board of this size can be used for prints 8x10 or smaller. The zinc forms a much better cutting surface than glass, for the prints do not slip and it does not dull the knife so quickly.



A device similar to the above is very convenient for cutting large sheets of paper into smaller sizes. For this purpose a drawing-board can be utilized by tacking a narrow strip of wood across one end for a stop. Rule off a scale of inches across one edge of the board at right angles to the stop, and use a T square as a guide for the knife.

CHARLOTTE CORDAY.

LITTLE THINGS.

By E. E. Weatherby, Plymouth, Ohio.

DO the majority of our fraternity give enough attention to the "little things" that claim, or should claim, their attention frequently? Are they not too often neglected for something that, for the time, seems more important? Some persons no doubt are better suited for overseeing work in general rather than for entering into the intricate details that continuously present themselves to the average workman. They prefer to leave these so-called minor points to a subordinate, while they superintend the mass of work. Are there not little points, however, that the careful operator, retoucher and printer must watch in order to become proficient in his respective branch of the work? May it not be his careful attention to the details of the work as well as his knowledge of business methods that fit him for more responsible positions later in life? Not only in a theoretical way but in actual business these things exist, as many a careful workman will testify.

By careful watching and a liberal use of "brains," as a good fraternal brother has often advised, many difficulties about the studio can be overcome, and perchance many orders secured that otherwise might be lost.

Some time ago a cabinet photo was brought to me from which an 11x14 copy was wanted. The original was a view, and was to be reproduced exactly, showing to the very edges of the print. The copying lens I generally use would not cut the plate sharp, and distorted the outer lines considerably. The tube not being made to receive diaphragms, I concluded to make a very small one of my own, which I inserted between the two lenses by removing the front one from the barrel. On looking on the ground-glass I could see nothing, so bad was the illumination. Placing my instrument where the direct rays of the sun fell full on the face of the picture, I got the same illumination as I did in the first place, with all parts sharp and clear cut. It was only a "little thing," but was it not worth trying? I have tried the same scheme on old dim pictures when only a bust copy is wanted, and I must say I have been highly pleased with the results, having never lost a plate that I know of.

At another time, by an oversight in development, I made a

very thin grey negative that was useless in that condition. Not having anything on hand with which to treat it, I put some of my hypo solution in a separate tray and poured in about one-third the quantity of old (pyro) developer and let it stand a short time, or until it had been stained sufficiently to make it intense enough for use. Rather crude treatment; only another "little thing," but it saved the order.

Has not the simple changing about of the lenses in a tube enabled an operator to make views, or even portraits, with a lens that otherwise would be useless for the purpose? Does it not pay to watch these "little things" instead of having a lot of lenses lying around the studio which you only use on special occasions, and that probably once or twice a year?

At one time having heard that a certain organization in a neighboring town wanted some group-work made, I dropped them a line, quoting my price on various sizes of work, and enclosed stamp for reply (total cost 5 cents). The reply was favorable, and I made nearly seventy 8x10 groups for the parties. Only five cents invested; only a little thing, but did not the returns justify me in the enormous outlay?

A little novelty suggested to the printer, perhaps by the merest accident, may yield his employer many dollars if properly used.

A little advertisement calling attention to a certain point of excellence in your work may prove of great value, and start trade in your direction that you might not reach by any other means.

A nice combination picture produced from a number of negatives, a striking pose of a graceful subject, the occasional loss (?) of a few plates in experimenting, and numerous other things I might cite, are small in themselves, but what of the results?

My experience has been, the more I simplify my work the better for all parties concerned.

Keep your developer in good order, filter it if necessary; see that your hypo is clear and free from precipitate; stick to what has proven reliable in the past; use your judgment about so-called improvements; simplify your work as much as possible; watch the "little things" as well as the mass of work, and you need have no fears of the future.

THE PRINTING PAPER OF THE FUTURE.

By C. E. Vredenburgh, Elizabethtown, N. Y.

A RECENT number of "Anthony's Bulletin" contained an article entitled "The Printing Paper of To-day." It was a successful attempt to show the superiority of collodion emulsion paper to all other silver processes. The contention set forth in that article may be regarded as established. It is difficult, if not impossible, at the present day, to find a professional photographer of any standing who uses any other paper for his best work. Albumen is unquestionably a back number. Gelatine, which promised so well and was so delightfully easy to work, proved to be too uncertain, both in immediate results and in permanence, to be deserving of confidence. It was like the little girl in the nursery rhyme whose conduct always rushed into extremes. If silver is to continue to be the printing medium, the logic of the situation is irresistible. We must use collodion paper.

But is it to be taken for granted that silver is to continue to be the medium with which photographic printing will always be done? The requirements of a printing process are sensitiveness, simplicity and, above all, permanence. Silver is sensitive enough, without doubt. Upon the score of simplicity or ease of working it is a little uncertain. Sometimes it behaves beautifully, and then again it will act as if all the demons of discord had taken possession of it. The newer kinds of paper are undoubtedly much more even in their working than those that were used a few years ago; but even with these the printer must give a sigh of relief when he finishes a batch with no "spoils." When we come to permanence, however, it seems to the writer that he who affirms that this quality belongs uniformly to any silver paper is a conspicuous example of the power of faith. There are albumen prints in existence that were made many years ago and are still as good as ever. I have in my possession gelatine prints made half a dozen years ago which have kept perfectly, while others not two years old have faded to a sickly yellow. No one has been able to tell, though many guesses have been made, why some prints have lasted and others, treated in precisely the same way, have faded. No doubt collodion shows a larger percentage of permanence than any other process, but it is rather soon yet to assert that it is absolutely permanent. Light itself, it must be remembered, exerts an influence upon nearly all

silver compounds, and unless it can be shown that the deposit in a silver print consists of the pure metal, which has not yet been done, there must remain an element of uncertainty.

There is a printing process, however, from which all admixture of doubt is absent, and that is the platinum process. I have used this process exclusively for about three years and have never had a failure that was due to the paper. My only failures have been the result of an error of judgment when making the first print from a negative. This I have eliminated by a very simple device. If I have any doubt as to the depth to which I must print, I make a blue-print. A platinum print ought to be carried to about the same depth, development allowing the operator to correct any slight variation with complete success. So much for simplicity. As to permanence, there can be no doubt upon that score. The deposit is metallic platinum, and certainly if there is an unalterable substance known to chemistry this is it. I have recently seen complaints of platinum prints fading. There must be something about these prints that is not what it should be. It must be remembered that the price of platinum has been high for some time past, and that high prices are always a temptation to some persons to put inferior goods upon the market. If platinum paper be purchased of a reputable house (it is unnecessary to mention names—they will suggest themselves to every one) I am quite confident that there will be no trouble of this kind.

The paper keeps much longer than the manufacturers claim for it. I am now using some that was made nearly a year ago and it works as well as it did the day I got it.

It has been a matter of surprise to me that the platinum process has made such comparatively slow headway among professional workers. A paper that is absolutely uniform in its results, that is so simple to manage that an intelligent boy could be taught in an hour to work it, that does not require waiting till the day's batch is printed before anything can be done toward finishing the prints, but, on the contrary, shows a completed work at the end of the day, a paper that never, under any circumstances, plays tricks, and that yields results that will be as good a century or more from to-day as they were when first turned out,—such a process would seem to be the ideal for which all have been searching. The price of the paper should deter no one from using it. By getting it in large sheets, the present prices for prints afford an ample margin of profit. Certainly no one who has ever used it would willingly return to the

messiness and uncertainty of silver printing. It fulfills all requirements of a perfect printing process, and yields a picture with which, for artistic effect, no other is worthy to compare. I firmly believe that it is only necessary for its merits and advantages to be brought more generally to notice for it to supplant every other process and become what I have ventured to style it, the printing paper of the future.

THE HAUNTS OF SHAKESPEARE.

By George E. Thompson, Liverpool, England.

STRATFORD-ON-AVON is common ground with English and Americans. From both sides of the Atlantic we flock in thousands to the shrine of Shakespeare. I have twice made the pilgrimage, and the fascination of the place and the wish to revisit it grows on me.

I was one of the fortunate few who, some fourteen years ago, during my first visit to Stratford, attended the inauguration performance in the new theatre forming a part of the Shakespeare Memorial Buildings on the banks of the Avon. Barry Sullivan and Lady Marten (Helen Fawcett) played Benedict and Beatrice in "Much Ado about Nothing." The old lady had long retired from the stage, but she played the part of Beatrice with the sprightliness and vivacity of an Ellen Terry. She never wanted a word, and looked and acted the part. Poor old Barry did well also. He was staying at our hotel. I remember we asked the chambermaid if he were staying there, and taking us upstairs, she pointed to a closed door, saying, "Those are his boots." Who could doubt the fact after that?

The theatre will hold eight hundred persons. The Memorial Buildings were erected at a cost of £30,000, of which sum Mr. Charles Flower bore three-quarters of the expense. Every April, on or near Shakespeare's birthday, certain of the poet's plays are performed. The building contains a museum and picture gallery full of valuable and interesting relics of the bard.

Last year, with camera on shoulder, I again visited Stratford-on-Avon. I found my way through the fine old city of Warwick, with its lordly castle and giant cedar trees; on to Kenilworth's mighty ruin, where, likely enough, the young Shakespeare imbibed much

of his love of players and acting, by watching and hearing the companies of strolling players who performed there and at other stately homes in the golden days of Queen Bess.

Photo. by G. E. Thompson.

MEMORIAL THEATRE.

At Stratford I put up at the Red Horse Hotel, a house much frequented by Americans. For did not Washington Irving write his "Sketch Book" within the little parlor, whose half-round window looks out on the broad street of the quiet town? But you cannot stay indoors in a place brimming over with memories of Shakespeare. You walk down the hill to where old Clopton Bridge crosses the Avon on many arches, and, passing over, you wander along the banks of the quiet stream, through green meadows, to gaze on the well-known view of the noble old church reflecting its tall spire in the water below. And this makes you long to enter the portal and visit the last resting-place of the great dead. So you turn back over the bridge and make your way right through the town, till you come to the fine avenue of lime trees leading through the graveyard to the church porch. It is early morning, but the door is open. The sunlight streams through the green leaves of the limes, the birds sing and the venerable grey walls and lofty spire tower overhead. Not so long back the town stocks stood near the church gate, and, likely enough, it was through seeing them that Shakespeare wrote "Like silly beggars, who sitting in the stocks rejoice

in their shame"—"The knave constable had like to have set me in the stocks."

The glorious old church is silent and deserted. A venerable verger comes out from the sacristy and walks away down the nave. Shakespeare's tomb is within the chancel, and the well-known monument, with its likeness of the bard, looks silently down on you from the wall. It was the work of a Dutchman of Amsterdam, one Jerard Jansen, who settled in London. He dwelt in Southwark among the actors and was a leading monument maker.

Photo. by G. E. Thompson.

HOLY TRINITY.

We leave the church and pass through the quiet suburbs to the streets of Stratford, where we come to what is known as the Ancient House. It is of great interest, especially to Americans, as the early home of the mother of John Harvard, the founder of the great American University. The house was built in 1596. Near here stands the fine old porch of the Chapel of the Holy Cross. It is said that this building is among the few that remain in the same state in which they stood in Shakespeare's day. The porch is opposite New Place, now a carefully guarded little public park. New Place was purchased by Shakespeare in 1579, and here he settled down after the toil of many years. The house came into the possession of the Rev. F. Gastrell in 1756. He has made an unenviable reputation for himself for all time, for he not only cut down the great mulberry tree, but actually pulled the house down.

Henly street is a quiet road off the great thoroughfare of High street, and here stands the house in which Shakespeare was born. It has been restored. In a few more centuries it may again look mellow and old. No lights are ever allowed in the house, but it is heated by hot water pipes. After Shakespeare's time it became the Maidenhead Inn. Then it descended to a pork butcher, and it was ultimately bought by the trustees for the nation, under the designation of "The Birthplace Committee."

Photo. by G. E. Thompson.

SHAKESPEARE'S BIRTHPLACE.

The charge for photographing inside the house or in any other building under the care of the committee is one guinea. The garden lies chiefly at the back of the house. It is well kept, and visitors are allowed to roam about and to bask in the sunshine after their tour through the house, which is a sort of Shakespeare museum. The garden contains a collection of plants and shrubs mentioned in the works of the bard.

Towards sunset, walk over the meadows to Shottery, an old-world village, where the thatched cottages congregate among old-fashioned gardens. It is about a mile to the cottage of Ann Hathaway. Dusk is creeping on and a red glow suffuses everything.

As we pass through one of the open spaces of the town the sound of silvery chimes falls on the ear. There stands the new clock tower, its four dials illuminated by gas. This pretty little monument was presented to the town by an American, Mr. Childs, of

Philadelphia, in memory of Shakespeare. Fountains surround the base, and appropriate quotations from the bard are carved in the stones above.

After a pleasant walk through the meadows we reach the village of Shottery and see the well-known cottage, with its thatched roof facing the many flowers of its pleasant old garden.

In Richard Hathaway's time the building, now divided into three cottages, was one house. The father of Ann Hathaway was a well-to-do man; he was more than a substantial yeoman, and the families of Shakespeare and Hathaway were intimate friends.

Photo. by G. E. Thompson.

ANN HATHAWAY'S COTTAGE.

The cottage looks still better from the garden than from the road. Open the gate and you stand in the midst of a paradise of flowers. In the pure air of Shottery they flourish as they did in Ann's time. The tall homely hollyhock, the gorgeous sunflower, roses, sweet lavender, pinks, sweet-williams and a host of other flowers carpet the ground, while the fruit trees yield their increase to this day, and the birds sing in the branches thereof.

In the ancient kitchen you find a genial old lady, who at once unites the past to the present when she tells you that she (Mrs. Baker) is the last of the Hathaways, her grandmother having borne that name. She is now 82, but she takes a kindly interest in showing you through the old home, taking you upstairs to see the fine old carved four-post bedstead with its embroidered counterpane.

The old lady will show you the ancient family Bible, with its time-honored names. She will talk to you of that old Bostonian, Dr. Oliver Wendell Holmes, and of the many actors who have visited her house; and lastly, she will see you to the gate and wish you God-speed.

A FEW SUGGESTIONS FOR CAMERA CLUBS.

By Geo. W. Gilson, Toronto, Canada.

LOOKING back over an experience of several years as a member of camera clubs of the States and Canada, a few facts concerning the best means of popularizing a club, of getting, holding and interesting members, suggested themselves.

A club, first of all, must be beneficial to the large majority of members. The term large majority is used here advisedly as against the club as a whole, for the reason that there will always be found members who seem to be incapable of being benefited. They, however, help to pay the way and are generally harmless. To be beneficial to the many, a club must be carefully constructed and officered.

There are always to be found in a club of this kind a few older heads, not necessarily in age, but in practice and in knowledge, who would make the meetings too scientific, too advanced. They are often found to have passed entirely through and above the every-day part of photography up to some particular hobby, which they delight to ride up and down before the admiring but uneasy members who have joined with the expectation of receiving instructions in the ordinary but necessary stages, such as development, toning, lantern slide making, etc. These past-masters of the art can be made very desirable and valuable members if they are but held in check and only allowed to exercise their hobby at intervals, as will be shown.

To be successful, a club must not only be beneficial from an instruction standpoint, but should also be interesting as viewed socially. Let us see if a combination of this kind cannot be effected. Taking the instruction feature first, demonstrations on all subjects should be freely encouraged; members there always are who are competent, and generally willing if approached in the right way, to

demonstrate different stages of work, and here is where the "past-masters" can be utilized. There are the men also who make a business of demonstrating. A good many clubs seem afraid to allow a professional demonstrator to pass the club door. This feeling is wrong; an invitation should be extended to every demonstrator who visits the town or city to demonstrate before the club, for which extra nights can be arranged if necessary. They may mention the name of their paper or plates as often as possible, but the little advertising they get is more than offset by the information they impart. One of the most instructive features a club can introduce is the beginners' or juniors' class night; set apart one night a week for this. Invite or appoint those willing and capable to help to take the class in turn; begin at the beginning and work up; make the boys do as much of the manipulative work as possible, have them bring a negative taken during the days, with full information jotted down as to plate and stop used, time, light, etc., as they are developed; explain fully the reason for success or failure, and always tell the reason why. Once a month or so have a one-man exhibition, in which some one member tacks up his best efforts for criticism and comparison.

Nights set apart for friendly competition in lantern slides are instructing and spur on to better work.

Build up a good library, take the journals and have them bound each year for reference.

Make a feature of the annual club exhibition, and don't sneer at the humble but earnest efforts of the young members; an encouraging word may make a medalist of him next year.

Join the slide exchange and have as many open nights as possible when the exchange sets are shown. Some of the old smokers may grumble at the presence of ladies as depriving them of their weed, but it advertises the club and secures new blood.

The grumblers can be squared by a club "smoker," with refreshments and progressive pedro or an entertainment feature added.

A yearly feature that is conducive of profit and considerable fun is the yearly club auction, when all the members bring apparatus they have outgrown, to be sold. The "funny" man of the club doing the selling and talking will yield a good night's amusement, besides saving one the trouble of throwing things away. Following out the ideas here suggested, and others that will suggest themselves, will increase a club's membership wonderfully, not only on the members' list, but in the club rooms.

SPECIALISM.

By A. C. Austin, Albany, N. Y.

COMPETITION drives so close a bargain in the commercial world that production in quantities is an absolute essential to success. That well-worn phrase, "Many littles make a mickle," is necessary in its fulfillment if one would enjoy life and its comforts, and he who can produce the most in the right way stands a fair chance for enjoyment. It must not be inferred from this, however, that quantity stands pre-eminent, for it is not so. Quality is also an important factor. The purchaser of any product is as critical when he pays a small price as when a larger price prevailed. The problem is one, therefore, of simple statement. How can quantity and quality be best served?

To my mind the matter has long been settled, but not being a pioneer in this line of thought I can claim no credit. I have a strong desire, however, to point out the solvent to those who may not have noted it. I allude to specialism. You can readily observe that a number of expert operatives, working conjunctively under one head, produce a superior article in relatively greater numbers, at much less cost, than can one individual who does it all.

The watch industry is notable in this regard. The pinions, the wheels, the springs, the dials, the hands, turned out by the bushel, accurate almost beyond conception, are collated in proper order, fitted and adjusted by the head specialist into a marvelous mechanism, fit to regulate the sun; in marvelous multiplicity as opposed to the product of the old-fashioned watchmaker, who laboriously filed and hammered out his timepiece.

Articles of ornament, utility, necessity, are all most successfully manufactured under the same system, and to attempt to cope against such organization single-handed is but to resign oneself to a bare existence.

This is more particularly exemplified in photography. You all know the "lone photographer," "knight of the camera," the retouching desk, the printing frame and burnisher. He exists. To say more is the exception. Quite often he exists by courtesy of the stock dealer, not from a fraternal interest on the part of the dealer, but solely in the hopes of getting his money back. Now this same "lone photographer" may be an excellent printer, his ability unquestioned, and were he given the opportunity could earn more for

PHOTO BY CHAS RICHARDS DODGE

THE SPARTAN GIRL.

himself in one week as an integral part of some whole than he could gather in several weeks by himself. That this opportunity can be granted to the many photographers I will not presume to say. Many must be contented with their existence. Photography is too old and too easy (?) to expect to elevate it except in isolated cases.

But photo-engraving is a newer field, and the specializing of its different branches is a matter worthy of deep consideration. Many photographers have been rushing into this business lately, hoping to make it a side issue to the regular gallery work, and prices have been materially lessened while quality has deteriorated. Sound business principles suggest that this condition cannot last. Process engraving is a necessity of the times, the people demand it, and as they become better educated they demand better work. Experience proves that specialism produces that better work, and those firms who have recognized this fact are producing the quality and quantities that must soon regulate the market to the detriment of the would-be "all-around" man. The expert operator, with his constant practice, makes negatives of better value and more of them than our "do it all" friend. The expert etcher, with his fine etching dodges, is eminently superior. The hand-tool engraver, whose experience enables him to finish the work so favorably begun, can change the whole texture, can add brilliancy, depth, technique to an otherwise mechanical product, all together making a combination impossible for any one man to equal.

Photo-engraving is an art, a fine art, worthy of the name, and as soon as the formative period shall have wholly passed it will take its place and be acknowledged. At present it is coping with the amateurs and "Cheap Johns," but the end is already in sight and victory will be the sweeter. All this leads up to the opportunity for admonition, which can readily be given in a few words. To the photographer I would say, don't take up any side issues. If you would still be a photographer, still be a specialist. If you would be a photo-engraver, ignore the generality and adopt some one part, making a specialty of that to the exclusion of all others, expecting and surely getting the financial reward and the gratification of aiding in the advancement of a beautiful art and worthy educator.

A PHOTOGRAPHIC TRIP TO THE TIP END OF YANKEE LAND. . . . . . .

By C. Emil Rönne, Philadelphia, Pa.

THE tip end of Yankee land, "Cape Cod"—how often have we heard of it, but how few of the amateur photographic brotherhood have ever been there to look for subjects quaint and new?

I must confess that it came over me this summer, and after consulting time-tables and maps, I made up my mind to enjoy a photographic vacation on that historic strip of land.

From Quaker Town there are many quick ways of getting "Down East," but perhaps following the staid and so-called slow methods of old Philadelphia, I decided to go by the slowest and longest route, and well was I repaid by such a decision.

So one fine afternoon in July I went on board the steamer Indian, of the Philadelphia-Boston Line; experience having taught me what to take with me for a photographic tour, I was well provided with a 5x7 outfit, a non-folding hand camera and several holders, and with Cramer Crown plates in large number.

I found the steamer Indian to be a very fine and comfortable boat, the first sight of which impressed me very favorably, and after making the acquaintance of Captain Nickerson I soon came to the conclusion I had found the right boat to enjoy the trip immensely.

Putting my traps in my stateroom, I armed myself with my hand-box and went on deck to see what I could capture, having about a half-hour to wait for the departure; so I studied the loading of the steamer, being well pleased with the amusing antics of the colored stevedores, all jolly black faces, beaming with good nature, though working in a broiling sun.

Too fast were my plates disappearing among these interesting scenes; but soon was the order given "All ashore, who's going ashore," and with a blow of the steam whistle we slowly backed out from the wharf, making the turn gradually, seaward bound.

A little saucy, puffing tugboat, thinking we might get into difficulties, was right under us, looking anxiously towards the pilot-house for the word to throw us a helping line, not noticing the indifference of Capt. N., who knows his craft too well to want any help.

"Full speed ahead" and off we go. Weather beautiful, cooled now by the wind made by the steamer itself, and, stationing myself high up near the pilot-house, I watch out for "incidents" coming within the focus of my R. R. lens—schooners, ocean-going tugs of the Reading R. R. with many coal barges in tow, excursion boats without number hurrying past us to the city to take more people to the many resorts on the Delaware, those who are looking for a cool breeze in which to spend a pleasant evening.

Fast we pass wharves, refineries, etc.; League Island, the U. S. Navy Yard, with many engines of war at its piers, where we see several old-time monitors, out of use now in time of peace.

There comes the fast steamer "Brandywine" of the Philadelphia-Wilmington Line. How fast my "holdered" plates are being used up! What will I do for a dark room? I must make friends with the steward and get a coal-black corner to-night, so I can fill up again.

Chester and Wilmington are reached and passed; we now enter the wide part of the river, Delaware Bay, and soon realize that it is supper-time on hearing the steward's bell.

We have been honored with seats at the captain's table, and are highly entertained with sea stories and good cheer, the whiff of salt air having given us a wonderful appetite; we linger over the good things set before us.

On deck again, camera at rest now, there being not enough light for any more work, we light our pipes and have a little stroll for digestion's sake. What a glorious night, so still and quiet! Stars begin to peep out, and we can hardly resist becoming sentimental.

Full liberty being given to the passengers to go everywhere, we ensconce ourselves in a comfortable spot; some of our fellow-passengers take to the forecastle-top, where they make a pretty group, well worth taking if there was enough light.

About 8 o'clock we pass the large excursion boat Republic, returning from Cape May with crowds of people on board, and darkness soon shutting out everything, we steam on for the capes, May and Henlopen, which we near about 11 P. M., now feeling the ocean roll, the Indian rising to its swell.

One by one we try to conceal our sleepy feelings, and soon drop down below to seek those comfortable berths.

After a good night's rest I wake up to find myself at sea. Five

o'clock A. M. seems an unearthly hour to get up, still I do it quietly without disturbing my room-mate, who is still enjoying his dreams.

In the saloon I find that hot coffee is in order, and after partaking of this bracing beverage I go on deck. Fine day; we are out of the sight of land; swell of small consequence. Neptune will have few tributes paid him on this trip if this weather keeps up.

I find the first officer, and have an interesting chat with him, finding out we have mutual friends down East. How the time flies! 8 bells, breakfast—all hands attend that meal; and how we eat! miraculous what the sea does for promoting an appetite.

Until dinner-time I find amusement in taking a few groups and scenes on shipboard. The weather being a trifle hazy, we see but few sails; but clearing about 2 P. M., Montauk Point looms up in the distance, and shortly afterwards we sight Block Island, to which we go near enough, satisfied that Capt. N. is helping us to get a shot at it.

How beautiful this trip is; so much to see when nearing land, and entering Vineyard Sound, we have shipping of all kinds about us, several interesting crafts; among others we note the swordfishing boats.

It is saddening to see the night coming on so fast; too dark now to see much more of shore line, and Vineyard Haven, Cottage City, are nothing but lights to us; still we steam on, passing several lightships, and at last we sight the Chatham lights, on the southern end of Cape Cod, before we reluctantly think of once more turning in.

About 5 A. M. I look out of my stateroom window and find, much to my surprise, that we are entering Boston harbor; in fact, we are just off Point Allerton. I hasten to wake my friend, and dressing, as the French say, "à la hâte," we are soon on deck, now steaming slowly into the harbor.

The view of Boston in the morning sun is really beautiful. We pass many handsome yachts anchored off South Boston, then quietly slip into our dock.

Our traps are soon gathered together, handshakes are exchanged with fellow-passengers, not forgetting our good Capt. N., who wishes us all pleasure on our holiday; so engaging a "hurdic," on which we hoist our trunk, we are whirled to a nearby pier, where we leave our luggage on board the steamer Longfellow, which we are to take at 9 o'clock.

We stick fast to our "hurdic" until we are landed at an uptown hotel, where we break our fast, after which (it being hardly 8 A. M.)

CRITICS.

we light cigars and take a stroll around town, doing the public gardens, common, etc., and finally find ourselves on the Longfellow, a few minutes before the hour for departure.

At 9 we cast off. I have my hand-box close by me, and "get" several more interesting subjects as we move out of the harbor, and an hour hence we are passing Minot's ledge lighthouse, a curious stone shaft rising right out of the water.

About noon we sight the tip end of Yankee land, Cape Cod, and the hills of the quaint town of Provincetown, where so many years ago our Pilgrim Fathers landed, and we enter its fine harbor not long afterwards, realizing how safe a one it is, such a sure haven in bad weather to the many vessels rounding this cape.

We go to Frank Smith's Atlantic House, where that genial host welcomes us, and after enjoying his best "fish dinner" we start for the afternoon train, for a 23-mile run up the Cape to the charming village of Orleans, where we have decided to stay, reaching there shortly after 3 P. M., and soon are made comfortable at the hospitable "Shattuck House."

Here we meet friends, employees of the French Cable Co., which company has one of its principal cable stations here, in direct communication by sea-cable with St. Pierre-Miquelon, 800 miles away, and with New York city by land wire. Orleans, for this fact alone, is well worth a visit, as nothing is more interesting and puzzling than the inner mysteries of the cable station, always opened with a welcome.

Trunks and bags are unpacked, rooms made comfortable and visitors arrive to bid us welcome to Orleans; also we are invited by Mr. Wm. O., the son of Mr. H. O., superintendent of the French Cable Co., to test the bathing qualities of the Orleans town cove, a beautiful sheet of water, coming in from the ocean side of the Cape, in which the "boys" of the cable station have placed a bathing raft, and well do I remember the enjoyable times we have had on that float.

We gratefully accept his kind invitation, and off we are on pleasure bent, and so we are every day for ten days of rare enjoyment.

The hot weather we read about in the papers does not reach us here, and cool blanket-nights fall to our lot.

Now for our photographic work. There are many interesting subjects to be taken—we soon found that out on arriving. Into a team we pile our "goods" and we go to the ocean-side, where we

At 6 o'clock we are in Boston and met by other friends in that good city. We are made very welcome, and for two days are taken to see many interesting places, Cambridge in particular, where Harvard College and its beautiful grounds and campus are soon registered on my plates.

We take a few trips to the nearby resorts, noting Nantasket among others, where we sample a degree of speed on the electric road not often surpassed by anything on wheels.

Well, we are dined and wined and conducted with all honors to the good ship Parthian, of the Philadelphia-Boston Line, and sent rejoicing on our homeward way.

My plates, though reinforced by another supply, are all but exhausted. I tremble at the long hours of developing and printing before me, though happy in the thought of having such a collection.

At 3 P. M. we cast off, and we are on our way home. Beautiful weather, sea like glass,—everything points to a fair and quick passage. We meet the U. S. S. Raleigh; fine sight, which I quickly take.

About sunset we see Highland Light, then later on Nausset, then Chatham, and we enter Vineyard Sound.

Captain Snow we find very kind and interesting, and we listen with pleasure to his early experiences at sea.

Another day at sea, and the following morning we wake up at wharf in Philadelphia, the trip being as interesting as the one up to Boston.

Here ends one of the happiest and jolliest of photographic outings. I can only advise, and that strongly, to others to go and do likewise. The time and expense will be found well spent.

On arriving home, after a short rest, I enter my dark-room, and commence developing, using metol, which I find works excellently for fast work, especially for Cramer Crown plates. I had them packed film to film in their boxes.

My outfit was perhaps a little large for the ordinary amateur, having hand-cameras and 5x7 camera, and quite a large number of plate-holders and plates innumerable.

I did no developing on trip, so only carried a small folding ruby candle lamp for exchanging, which I found was better than the bothersome oil.

I am glad to say that my collection of exposures turned out very well, and I have another album full of photos that I am not ashamed to show to anybody.

ON USING OTHER PEOPLE'S CAMERAS.

By Miss Adelaide Skeel, Newburgh, N. Y.

I SPEAK from the borrower's point of view, and say, Don't. It may be more usual to protest against the habit from the lender's standpoint, and I, who have too often yielded to a generous impulse and lent my photographic property and failed to receive it back intact, could write a folio on lending, had I not suffered yet more from the borrowing habit.

Granted that at the outset of one's photographic career it may be well to try a few machines before deciding which one may be the best suited to our needs, I wish to protest against the indiscriminate acceptance of offered kodaks and view cameras. Here are some of my adverse experiences: I own three outfits, and I use them all in turn. They have their limitations, but so have I, and we agree to disagree, and the result is that I get fairly good pictures when I refuse the loan of other people's apparatus. David was no amateur at giant-killing, and knew enough not to borrow the armor of King Saul. Let us be as wise as the unlettered shepherd boy and hesitate to use unproven weapons.

I am visiting at a country house, when a rich bachelor puts at my disposal the use of his brand-new 8x10 outfit. The valet brings it to my room, in its long, yellow leather valise, which looks so like a dress suit case that I blush to see it in my maiden bower. The butler touches his finger to his forehead and gives me to understand that this offering from his master is the next thing to the presentation of his hitherto undisposed heart and hand. I accept the loan tentatively, and while the rest of the house party are enjoying hammocks, iced tea, fans and flirtation on the piazzas, I toil with hasps, clasps and screws. At last it opens, it unfolds, it extends, it stands on its legs, thank heaven! There is ever a family resemblance in tripods, and one need not look in the newest make for a fourth pod or a two-headed top. Loud cries from the lawn summon me to take a group, which I do, all of a tremble. I put in holders, set the shutter, squeeze the bulb, by faith, not sight, since every special part differs from my own machine at home. When the bachelor returns from his golf playing at dinner-time, I tell proudly of my beautiful photographic hazard, and he says sadly, "I forgot to tell you that the holders were not loaded, and I was sure

you had photographed so much the new bulb release would not bother you. Of course, you set the shutter twice. It is a London patent."

I make no answer. The guests wait in vain for their pictures; the bachelor receives back his outfit, plus innumerable scratches on the mahogany, not to mention certain bent brass hasps and twisted screws. I remain a maiden, he a bachelor, and I wish I had not borrowed his camera!

Again, a lady calls with her husband's kodak, and she coaxes me to leave my own instrument at home, using his in preference, because "it cost a fortune and nobody gets the good of it." It has been newly loaded with films; her small niece does wonderfully well with it; she has lost the book of directions, but I will not need them, she is sure. I am not sure, but remembering former occasions when I have let horses run away from the finder while drawing my slides, I take the kodak in hand, and we proceed to the stables. Here the grooms wait, outwardly deferential, inwardly amused at my awkwardness. Mechanical experts being born, not made, I, being but yet a woman, have considerable trouble from the start. The kodak will do little else than fold, but that it does to perfection. I press, I squeeze, I pull; the wife presses, squeezes and pulls, and after awhile a coachman comes to the rescue, and under his strong thumb the box, Pandora-like, flies open to let loose a swarm of troubles. I do not know shutter from roll, but hurried on by its owner to "do something," I order the horses to be posed in the field and take *ad libitum*. Certainly we must have taken something, and certainly we have taken something, for on development we find we have taken two dozen exposures on one bit of film. We have truly made two dozen excellent pictures, but, alas! we have all the horses in a composite, ranch-like group, and cannot detach a single stallion, mare, colt or pony as a separate artistic delight. This has happened before, but, as my friend says, she thought I "understood photography."

If one could obliterate patents and have all cameras made on one plan, one might advantageously borrow and exchange outfits, but considering things as they are, I can only advise the readers who, like myself, own machines with which they have at least bowing acquaintance, to refuse the lender, loan he never so coaxingly.

CLOUD PHOTOGRAPHY.

By Alfred J. Henry, U. S. Weather Bureau.

A CONSIDERABLE mass of information concerning the condition of the air at the surface of the earth has been accumulated, but we know very little of what is going on at some distance above us. The regions of the higher atmosphere have been studied to some little extent through the scant data afforded by balloon ascensions, mountain meteoro-

Photo. by A. J. Henry.

logical observatories and the movements of upper clouds. While the latter method is not so promising in direct results as others that might be mentioned, its simplicity and adaptability commend it to all lovers of science.

The question of cloud photography is of especial interest at the present time in view of the resolutions passed by the International Meteorological Committee at its meeting in Upsala, August 20-24, 1894, as follows: "Since experience shows that the altitude of clouds can be easily determined with sufficient accuracy, the generalization of these investigations in all countries is recommended, preferably by the use of the photographic process. Observations of direction and relative velocity should be made at as many stations as possible, and measures of height at a limited number of suitably distributed stations.

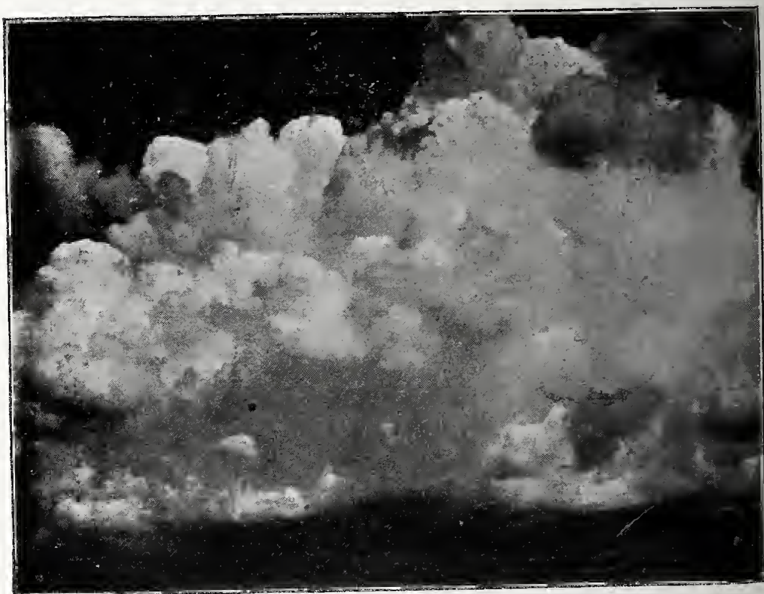


Photo. by A. J. Henry.

"The value of these investigations would be greatly increased if made at the same epoch, therefore it is proposed that they be commenced May 1st, 1896, and continued for one year."

Cloud photography has received more attention during the last ten years than at any time since the introduction of dry plates, and it is now possible, as a result of the efforts of amateur photographers and meteorologists alike, to obtain fairly good negatives with comparatively little difficulty. The employment of the camera to permanently fix the appearance of the sky, and the changes in the form of clouds, cannot be too strongly recommended. One of the most

practical results likely to flow from a close watch of the sky is the ability to associate various cloud-forms with coming weather changes. After an experience of four years in this regard, I am confirmed in the belief that for the purpose of forecasting the weather the clouds afford the most valuable data at the command of the solitary observer.

With a view of increasing activity in cloud work during the coming year of special observation, and to encourage all who may be inclined to take an active interest in cloud photography, the following suggestions are offered:

Photo. by A. J. Henry.

Apparatus.—No particular form of camera is required. Hand cameras have the advantage of being ready for use at a moment's notice, and when a cloud mass is changing rapidly it is possible to make a series of exposures at a very few seconds' interval. For the best results, however, a tripod camera should be used. A lens of the rectilinear type, having a focal length equal to the diagonal of the plate used, is best suited for cloud work, and one should always be careful to adjust the camera so that the sensitive plate shall be exactly perpendicular to the optical axis of the lens.

It is perhaps unnecessary to state that when a color is looked at with the naked eye the sensation experienced is the joint effect of the various elementary colors of which it is composed. We are all familiar, too, with the method of resolving a beam of solar light into its constituent colors. When we examine these colors as regards their action on the ordinary photographic plate, we find that those of the greatest visual intensity—yellow and orange—have the least actinic effect, while the blue and violet rays are especially active. Should we attempt to photograph the colors of the spectrum with the ordinary commercial dry plate we will find that the blue and violet rays will be rendered almost white and the remainder of the colors of a uniform blackness.

To reproduce these colors in their correct monochromatic value we must use plates that are specially sensitive to the most luminous rays, and restrain those rays that are most active, and this is what dry plate makers aim to accomplish with the so-called isochromatic or orthochromatic plate.

There are various brands of orthochromatic plates on the market, such as Cramer's, Carbutt's, Wuestner's, and others, and they tend to maintain the natural relations of light and shade in a greater or less degree. Before determining upon the special brand to use, it is advisable to make a comparative test of those named; the experience thus gained will be valuable and will amply repay one for the expense of the plates.

Orthochromatic plates necessarily require a little more care in their treatment than ordinary plates, since they are especially sensitive to yellow light of any kind. A dark-room light that is safe for a quick plate of the ordinary kind may fog an orthochromatic plate.

Screens.—It is found that the interposition of a suitable color screen between the clouds and the sensitive plate, in order to restrain or subdue the blue and violet rays, adds greatly to the resulting photograph. Various screens have been devised and used with greater or less success. Dr. Riggenbach, of Basle, as early as 1885, described a method that gives very good results. He places a black mirror in front of the lens so that the plane of the mirror makes an angle of about 33° with the axis of the lens, and thus takes advantage of the fact that some of the blue light of the sky is polarized in a certain plane, while that from the cloud is not. A Nicol prism or other polarizing apparatus also gives good results.

In my work, however, only glass and liquid screens have been

used. The screen first devised is described and figured in the Scientific American of March 2, 1895. The liquid used as a ray filter is bichromate of potash, as recommended by M. Angot, of the French Meteorological Bureau. A ten per cent. solution is first made and diluted until the required density is reached. A two per cent. solution is sufficiently dense to photograph cumuli and well-lighted clouds. For cirrus eight per cent. solution may be used, but there is danger of blurring from prolonged exposure if the clouds are moving rapidly. For that reason a five per cent. solution is preferred with a quick exposure. The commercial screen made by Carbutt is about equivalent to a two per cent. bichromate solution. Care should be taken to see that all of the blue rays are not cut off; the absence of blue in the negatives gives an unnatural blackness to the sky that should be avoided as far as possible.

Exposure Times.—As in all photographic work, the exposure time varies according to the season, the time of day, the illumination of the object, the density of the screen used, and other circumstances. With a Carbutt screen or one of equal density, and a plate of sensitometer about 20, an exposure of 1½ seconds stop f. 16 will suffice for a well-lighted sky at noon. It has been my experience that it is best to err on the side of over-exposure, correcting the result in the development.

A short exposure, while giving the necessary detail, does not give sufficient contrast between the cloud and sky, and it is quite difficult to bring out the clouds in bold relief in the after process of printing. Some workers advocate short exposure and subsequent intensification of the plate, but the latter process is liable to permanently injure the plate and it is better to avoid it.

Development.—The development of the plate is one of the most important steps in the work.

There does not appear to be a decided advantage in using any one developer in preference to another. Pyro, hydrochinon, metol, may be used indiscriminately, but it is essential that the developer be strong in the reducing agent and highly restrained. The following formula, recommended by Mr. L. E. Jewell, of Johns Hopkins University, has been used for several years and gives excellent results:

H.	Hydrochinon	1 oz.
	Sulphite of soda	5 oz.
H.	Water	25 oz.
	Alcohol	3 dr.

C.	Carbonate of potassium	1 oz.
	Water	100 oz.
P.	Yellow prussiate of potash	1 oz.
	Water	100 oz.
B.	Bromide of potassium	1 oz.
	Water	10 oz.

For normal development take:

75 cc. H.
$12\frac{1}{2}$ cc. C.
$12\frac{1}{2}$ cc. P.
11 drops B.

In general, the development of a cloud negative may be carried farther than a simple landscape, and it is often necessary, especially in the case of lighter clouds, to continue the development for some time after the image has apparently vanished from the plate.

It is important, in order to fix the position of the clouds in the sky, that a small stretch of the horizon be included in the view, and that the direction in which the views was taken, as NE, SW, etc., be noted on the photographic plate before development. One can make the entry with an ordinary lead pencil in the corner of the plate. In fact, the date, stop used and exposure time should all be noted on the plate for future reference.

For ascertaining the height, direction and rate of motion of clouds, it is customary to employ two cameras at either end of a measured base-line, making the exposure simultaneously by means of an electric current. A simple method of reducing the observations was devised by the late G. M. Whipple (Quarterly Journal of the Royal Meteorological Society, July, 1894). In this country a very valuable series of measurements, principally with theodolites, was made under the direction of Mr. A. L. Rotch, director of the Blue Hill Observatory, but no other observations of like character have been taken in this country.

Some attention has been given to developing the art of cloud photography at the Weather Bureau, and it is hoped to continue the experiments during the coming year.

THE REHEARSAL.

METOL DEVELOPER.

By H. W. Hales, Ridgewood, N. J.

AS this developer has so many excellent qualities, among which are its durability and the clearness and brilliancy of the negatives it produces, I may be pardoned for adding one more formula to those endured by the long-suffering photographer. There may be nothing new in this formula, but as I have known no one to use it this way, I give it in hopes some one may find in it a developer that suits them. To my mind it comes as near a "universal developer" as anything known, as it may be used for lantern slides, bromide prints, etc., besides negatives. Dissolve 75 grains of metol in 16 fluid ounces of water; add 2 ounces of sulphite of soda and dissolve, and it is ready for use. The impurities in the sulphite of soda seem to furnish enough alkali to develop the plate slowly, and in using, all that is required is to carry the development far enough, and you will get nice, clean, brilliant plates that will well repay the trouble. Can be used repeatedly until too slow-working.

PHOTOGRAPHIC CLEANLINESS.

By H. W. Hales, Ridgewood, N. J.

THERE are few things more annoying to the careful photographer than finding his plates or prints full of markings or spots, and there are times when it seems almost as if the things were "possessed," so obstinate do they seem in this respect. The writer was impressed by this very forcibly a few days since. Having purchased some new rubber trays 20x24, they were thoroughly cleaned with soap and water and a stiff brush, then scoured with Sapolio, and afterwards well washed with more soap and water and well rinsed several times. On washing a lot of 11x14 chloride of silver prints therein, all those which touched the tray before toning were speckled and spotted like brook-trout, but not near so handsomely.

As the trays had apparently been so well cleaned, the spotting of the prints appeared very puzzling, but a careful and close scrutiny soon revealed the trouble. In vulcanizing the rubber trays there were apparent small specks or spots of sulphur which had not been dissolved, and these were the authors of the mischief. Strong sul-

phuric acid with bichromate of potash in saturated solution was used in vain, and not until the trays were coated with paraffin did they become safe to use. These rubber trays are very much used by photographers, and no doubt are the cause of much trouble to the inexperienced worker. Let any one who doubts this develop one of a pair of negatives in a dull tray of hard rubber or even of ebonite, and then develop the other in a glass or porcelain one, and he will probably have an object-lesson he will not soon forget. Who can tell also whether the fumes arising from hard rubber slides in holders do not frequently fog the plates? A careful examination will frequently show specks of sulphur in the rubber. What can be said of those amateurs' cameras that are constructed entirely of hard rubber? These hints are thrown out in the hope that they may lead to further investigations in this line, and we now have so many intelligent amateurs and professionals that a mere hint is enough to cause them to "do the rest."

Another cause of much mischief, more frequently among amateur workers, is pyro. This substance, being very light, is often blown around the room, if weighed out or used where the printing is done, and the stars which it sometimes causes to appear on silver prints are anything but beautiful.

Hyposulphite of soda has been known so long as "bad when out of place" that a hint certainly ought to be enough in that respect, but how often do we find the hypo solution in the dark-room dripping over the floor and drying there, only to be ground up by the feet of the operator next morning and sometimes "fixing" the negatives before development.

THE PRESERVATION OF NEGATIVES.

By Fred. H. Davies, Birmingham, England.

PHOTOGRAPHERS are proverbially careless folk! I have heard this remark many times, and have often thought, when looking at the workrooms of some of the craft, that the stigma is not wholly undeserved.

In no way does the careless worker display his carelessness more ostentatiously than in the after-treatment of his negatives. Often have I seen them lying about on shelves or benches, or, if they are put away in boxes, it is seldom they are previously numbered and

varnished, and but rarely are they placed with the films all one way so as to minimize the risk of scratching. The writer has for many years tried to impress on all who handle negatives the advice "film down." No matter if the negatives are stacked in heaps or packed away in boxes, the same advice holds good. If it is not observed, scratches are certain to be a prolific source of annoyance, for it is most difficult to remove one piece of glass resting on another without bringing the edges of the upper one in contact with the surface of the lower. Then, if the lower negative be film up, a scratch will probably be produced, and a negative, which possibly entailed hours of thought and labor in its production, is ruined for ever.

Of course the above remarks are chiefly applicable to those who only take up photography as a relaxation from other work; but many of my professional brethren do not pay sufficient attention to the preservation of their negatives. In many portrait studios even, where good class work is done, only special negatives are varnished, and often the registering is done in a most slipshod fashion.

It has been said that unless well varnished a negative is often the worse for the operation. That this is true I will readily admit, but the difficulties are so very easily overcome that any one, by a little patience and perseverance (qualities that must be possessed in a more or less degree by every successful negative maker), can produce a coating of varnish on the film side as smooth and free from blemishes as the film itself.

To those who have found a difficulty in getting the varnish to flow smoothly (and I know that even amongst good workers there are a few such) the following directions may be useful, although it must be borne in mind that an ounce of practice, so far as negative varnishing is concerned, is worth rather more than the pound of theory.

Before varnishing, the negative should be carefully spotted and then numbered. The latter may be done either with writing ink of a dense black quality or with zinc white rubbed up in a weak solution of gum arabic.

Good varnishes are now easily procurable from any dealer, but to those who prefer to make their own (and many workers find a pleasure in doing as much for themselves as possible) I can recommend the following formula, which is quite reliable and has the advantage of being cheap.

White shellac	5 ozs.
Orange shellac	7 "
Sandarac	$\frac{1}{2}$ "
Methylated spirits	60 "

This should be mixed some days before needed, and cleared by adding 4 ozs. of whiting or chalk and shaking up at frequent intervals. At the end of two or three days the clear liquid should be decanted and filtered into a clean bottle. Every drop of varnish that has been flowed over a negative should be similarly treated before it is re-admitted into the stock bottle.

For apparatus nothing more is needed than the means of procuring heat, a dusting brush and a few scraps of blotting paper. Pneumatic holders may be useful for very large negatives, but they are quite unnecessary for the smaller sizes. For those who have a gas supply, a small Fletcher stove is the best heat producer, but a spirit lamp with a large circular wick makes a good substitute.

When the ink on the negative is thoroughly dry the film should be lightly dusted and the negative warmed. This should be done carefully, holding at a good distance from the flame and with a circular motion, or the negative is liable to crack.

When just warm all over, place the negative on the flat of left hand and liberally pour a pool of varnish on center of plate. Now tilt the plate to the left and let the varnish cover each corner. Then flow to the distant right-hand corner, and finally pour off superfluous liquid from nearest right-hand corner. The hand must be kept steady now until the spirit has evaporated, but in the meantime the dripping edges of plate may be dried by means of the blotting paper. When quite set the negative should be thoroughly heated over a stove, and when cool the coating of varnish will be found to possess remarkable hardness and will not easily scratch.

If a speck of dust is on the film the varnish will flow round it and leave a small portion uncovered. This may be avoided by touching the spot with corner of blotting sheet, taking care to keep plate steady during the operation.

Should the film of varnish be creased it should be removed with methylated spirits before the final heating. After a little practice, however, the occasions for this will be very rare.

The negatives may now be packed film down in the boxes sent out by the plate makers. It is better to put a piece of soft paper in the bottom of box, but it is unnecessary to place paper between

PHOTO BY GEO. G. ROCKWOOD. ENGRAVED BY HAGOPIAN PHOTO-ENGRAVING CO.

THE FISHER MAIDEN.

each negative. The box may now be labelled and is then ready for shelving.

An article on such an elementary subject as varnishing may seem superfluous in these much-informed days, but the writer has seen so many valuable negatives spoiled for want of proper care in storage that he must make it his excuse for taking up so much valuable space.

PINHOLES AND PATCHES IN NEGATIVES.

By I. C. Johnson, Gravesend, England.

Pinholes.

IT is very annoying to find several pinholes on an otherwise good negative. The first idea in the mind of the operator is that this batch of plates is faulty; he writes to the maker about it. He is, however, courteously assured that the plates are good, that dust has got on to them, and is advised to use a camel's hair brush to remove it before putting them into the slide. He uses a brush both before and after exposure; still there are pinholes. This has happened to the writer, and it occurred to him that the washing under the tap might have something to do with it; so he tied a piece of thin calico in the form of a bag on the end of the delivery pipe; this acted as a filter, and there were no more pinholes. From whatever source the water is derived there will be found in it small particles of sand. After about a week's use of this contrivance, if the bag be taken off, a considerable quantity of sand will be found on this filter, some of which would have got on to the plate.

Patches.

The amateur reader will sometimes have found one part of his negative less dense than another part, and that a kind of patch appears upon it, which of course appears upon and spoils the print. What is the cause of it?

The gelatine film on the plate is generally very repellent, and when the developer is poured on it often refuses to flow all over. Some parts for a moment are without any of the solution, whilst it is acting powerfully on other parts, and a marking is the result.

This happens when the developing is commenced with a developer of full strength. To prevent this the writer uniformly begins with an old or nearly exhausted developer. If this does not flow at once it has not strength enough to affect the film before complete covering. Besides, this preliminary developing prepares the film for the stronger developer, so no patch or stain results.

Spots on Prints.

On the gelatine printing-out papers very small air bubbles will oftentimes adhere, thus preventing the toning from acting where they fix themselves.

The writer has found this, and recommends that, whilst toning, the surface should be closely watched, and if bubbles appear, a touch with the finger will remove them; if not removed, a series of red spots will be on the print.

A RAMBLE IN CONNEMARA WITH A CAMERA.

By M. W. Thompstone, Manchester, England.

THOSE who are in search of the picturesque, and who do not care to follow in the beaten track of the tourist, can't do better than pay a visit to that little-known district in the west of Ireland—Connemara.

The best and quickest route from England is via Holyhead to Dublin, then by the Midland Great Western Railway to either Galway or Westport. Tourists from America land at Queenstown and proceed by way of Killarney to Galway, or they can reverse the route and make Connemara their last visiting place before returning to America.

The town of Galway stands at the mouth of the Gallive river, where it empties itself into the Bay of Galway. There are several interesting photographs to be obtained both in and around the town. The principal are Lynch castle, a square heavy-looking building, ornamented in the Spanish-Irish style, and dating back to the 15th century; the Claddagh, and Menlo castle, on the Gallive river, two miles north of the town.

Salthill, on the shores of the bay, 20 minutes' ride by train, will also furnish work for the photographer.

While at Galway a visit should also be paid to the Arran Isles, which lie at the entrance to the bay.

From Galway we have the choice of two ways whereby to enter Connemara proper, viz., by car along the shores of Lough Corrib to Oughterard and Recess, or by the steamer Eglinton to Cong, and from there by car via Ma'am to Recess. I chose the latter and was not disappointed with my choice, for some of the loveliest scenery in the west of Ireland is to be met with at Cong.

The village consists of a single main street, at one end of which stands the Market Cross. Many natural curiosities abound in the neighborhood, the chief of which are the subterranean streams connecting Loughs Mask and Corrib.

Cong Abbey, the chief object of interest in the locality, is situated in the grounds of Ashford. Built about the commencement of the 12th century, it is now little more than a ruin, although the entrance gateway and several of the windows, which have resisted the effects of time, show that the decorations done in the Norman style must have been very beautiful.

The road to Ma'am, 15 miles from Cong, passes through scenery of the wildest and most desolate type. Close to Ma'am, on a small island in the center of the western extremity of Lough Corrib, is the ruin of Castle Kirke, or Hen's castle, said to be the oldest of its kind in Ireland.

Ma'am stands at the entrance to the Joyce country, and the scenery here defies description. Whichever way you turn, you are met by mountains whose heights vary from 1000 to 2000 feet, arising from the valley in wild and savage grandeur.

Recess, my next stopping-place, is situated on the shores of Lough Glendalough. It is the center of the famous Ballynahinch fishery. The light railway between Galway and Clifden passes through Recess, but it was not quite completed when I was there.

I did not visit Clifden, but turned aside and made my way to Letterfrack, through the passes of Inagh and Kylemore. The pass of Inagh, guarded on one side by the mighty giants of the Twelve Pins, under whose shadows nestles Lough Inagh, and, on the other, by the Ma'am Turk range, should on no account be missed. At the entrance to Kylemore Pass is Kylemore castle, built in the castellated style of the Elizabethan period.

Letterfrack, picturesquely situated close to Ballynakill harbor, makes a good center for several excursions.

Up to now my road had led me through country whose surface

consisted mainly of bog and peat, covered with coarse reeded grass, interspersed with pools and streams of water; thinly populated, the cottages being no better than hovels; but from here the ground, although rocky, was better cultivated, and improved still more as I proceeded further north.

Leaving Letterfrack for Leenane, the best route for the photographer is along the coast, past Lough Muck, Salruck Pass and bay, Lough Fee and the shores of Killery Bay. Leenane consists of about half a dozen houses, excluding the hotel and constabulary barracks, and those who can spare the time can't do better than spend a few days here in exploring the neighborhood.

With one or two exceptions there is little to interest the photographer between Leenane and Westport, for, after leaving the course of the Erriff river, the country is a flat plain, used chiefly as pasture for large flocks of sheep and cattle.

Westport, a market town of more importance formerly than it is at the present time, furnishes work for the camera in several of its streets, and excursions should be made to Louisburg and Achil islands.

Having arrived at the confines of Connemara, I must bring my remarks to a conclusion, though it is impossible in a short article such as this to do justice to its beauties. Those who care to venture must not expect first-class accommodation, but what there is is clean, and they can hardly fail to derive some benefit from a tour among the Western Highlands of Ireland.

A NEW REVOLVING MULTANGULAR GRATING.

By Macfarlane Anderson, Northport, Wash.

IT has not been unusual in the last year, when reading over the literature devoted to our art, to note such questions as, "Where may we look for further improvement in the half-tone process?" and queries of a similar nature.

Presses have been built to meet every requirement in this work. Paper and ink manufacturers supply material to meet every demand. Yet the one principal drawback to this process, the screen grating, the foundation of the art, remains practically unchanged. From the moment of its conception and production by its inventor,

Von Egloffstein, in 1861, to the present moment, there has been no actual improvement.

The feature of annoyance to many, and the point readily seized upon for ridicule and criticism, has ever been the "screeny" effect given to the engraving; an unavoidable characteristic of the rectangular structure. Although much has transpired in certain methods of late to mitigate this monotonous regularity of surface,

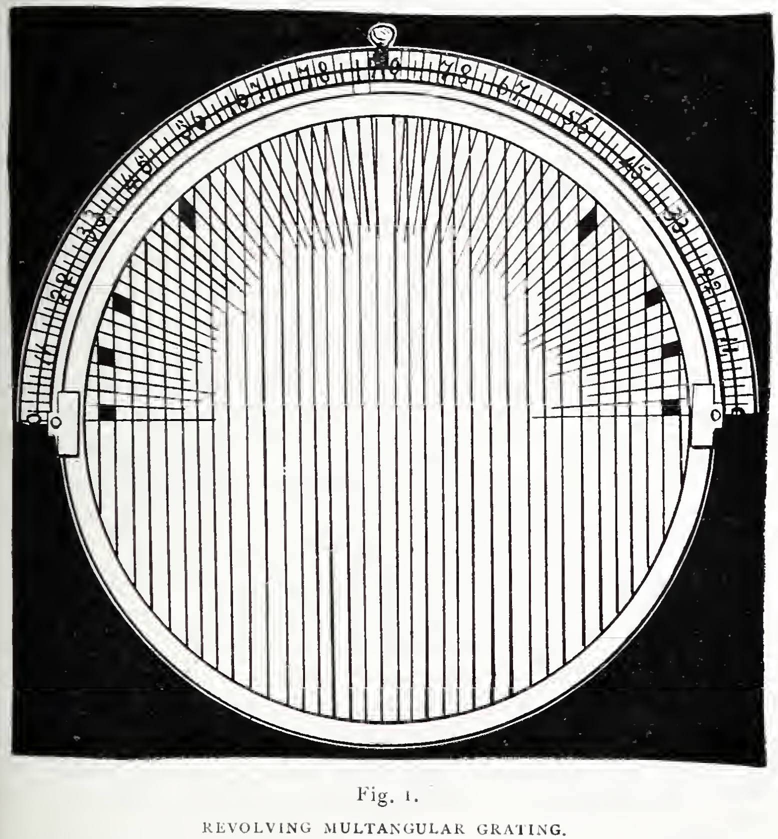


Fig. 1.

REVOLVING MULTANGULAR GRATING.

we are still steadily held down to this one tool alone, a tool whose possibilities are certainly very limited and from the general characteristics of which we can never depart, that is, so long as it retains its present form.

What the professional workman really requires is some such instrument or mechanical arrangement as would facilitate the working out of his ideas and conceptions, embodying the individuality of the

artist in each and every production; an instrument capable of depicting on any part of the plate certain configurations of line, stipple, tint, or dot, in the rendering of his subject.

Such a machine or instrument at first glance no doubt seems somewhat of an impossibility, and some years ago, when studying out the problem, the difficulties seemed insurmountable. I am able to state, however, that all obstacles have been overcome and an instrument designed capable of giving any effect desired in monochrome or tri-color engraving.

Fig. 1 is a front view of a revolving multangular grating, working in two side segmental bearings. The top, or upper half circumference, is furnished with a divided slotted scale, through which an index finger, attached to the screen beneath, projects. The scale in this instance is drawn to show the degrees. In the instrument it is flat, following the outline of the casing.

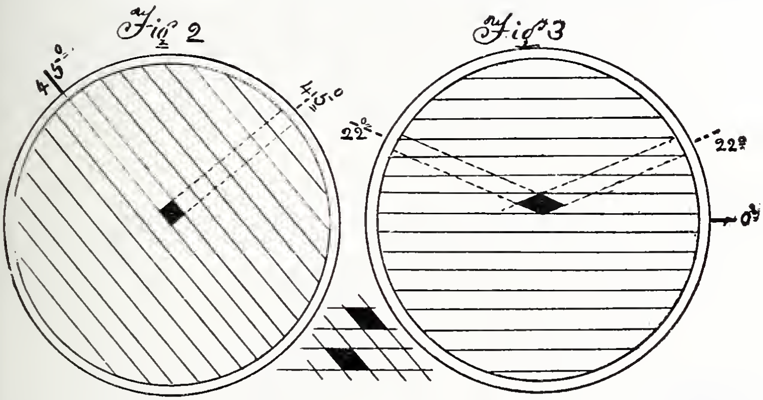
The radiating lines drawn around the circumference show the different structural formations that may be obtained on the negative, the first exposure, in this instance, being made with the index finger at 90° zenith. To make the second exposure it is necessary only to move the index to 0°, when we have a negative giving a rectangular structural formation, the dot having its sides or lines parallel to the plate. In making the second exposure, or third, if need be, the indicator is simply pushed to position, lens remaining uncapped. By this method we secure greater detail and softness in our work than is possible with a cross-lined screen.

Referring to Fig. 2, you will observe with the index finger at 45° left of zenith, and second exposure at 45° right of zenith, we produce a negative having a structure representing the ordinary half-tone, the rectangular formation being diagonal to the perpendicular. The reader will observe that any shaped dot can be made to occupy any position in a circle of 360° by simply working round the circle in the crossing of the lines. Perceiving this fact, it will be understood that the combinations are exhaustless, this applying more especially to multicolored work.

A workman with such a screen is prepared to produce such effects in the resultant engraving as will certainly show his individuality in every creation that comes from his hands. When working from transparencies in monochrome or color work, any manner of texture may be had on different parts of the negative by masking certain parts before movement of the index finger to a new position.

Figs. 2 and 3 show, projected underneath, the formation of an elongated diamond-rhombus. This structural formation gives an amount of half-tone, or more of the picture and less of the screen, than is possible of attainment with the old rectangular grating.

The dotted lines in Fig. 3 show a similar structural formation, the rhombus in this instance occupying a different position on the negative. The structural formation secured by the lines crossing at



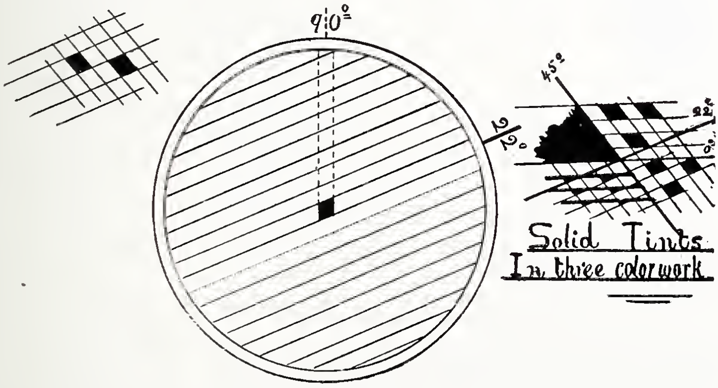


Fig. 4.

22° and 0° is also shown in Fig. 3 in the white spaces enclosed with these lines. This, again, is different to the foregoing.

Fig. 4, with index at zenith and 22° left, gives a structure producing less of the picture and even more of the grating than we get with the old rectangular grating.

With the index at 45°, however, as projected from Fig. 2, and at 22° left, as shown in Fig. 4, we obtain entirely different results, a

formation surpassing the old rectangular dot and readily adapting itself to the production of solid tints in the new tri-color printing process, a problem, so far, no one has been able to solve.

To estimate this instrument at its true worth one only requires to look at the projected lines from all three formations and observe the ability and capability this instrument possesses in building up solid color tints in photochromic work.

With the advent of this instrument a new power has been placed in the hands of the engraver; the sneering criticism regarding the grating effect passes away, the possibilities of the printing press to produce solid color tints being proven by facts at last.

THE CAMERA AND THE WHEEL.

A Medley.

By Joseph Cottier, Jersey City, N. J.

THE readers of the International Annual will perhaps be interested to know that I have a friend, quite an intimate friend in fact, who rides a wheel. So far this is a not very extraordinary predicament. My friend also has had experiences which are not very extraordinary; among others, last season, he gave up in despair the task of trying to make satisfactory and permanent proofs by means of the various papers on the market and with the light at his disposal, which consisted principally of moonlight and candle-light or its equivalent, and he began to take up the making of lantern slides instead. At about the same time Monsieur mon Ami began to try wheeling as a pastime and to use this very patient animal, the wheel, to carry his camera instead of using his back.

The only thing now remaining was to devise a suitable camera to carry on the wheel, and many is the sleepless night that my friend assures me he has passed in order to solve the problem. He produced a tangible result, but I am only permitted to offer his results for publication so that it may cause others to put on their thinking caps and drain their ink-wells in the task of letting us know of their experience.

The first point to be settled, that of size of plate, was soon decided in favor of $3\frac{1}{4}'' \times 4\frac{1}{4}''$, so as to obviate the necessity of reducing

the image in making the slide, an operation which is always tedious and thankless in the night-time. But this size, while simplifying the operations in one way, made them much more complicated in another, for the picture must now be taken on the plate exactly as it is to appear on the finished slide, with not over a quarter of an inch of leeway in position and none as to size.

The position of the photographer in outdoor work is not generally a variable one, if any special point of view is desired, and as Mahomet cannot go to the mountain, the mountain must be made to come to Mahomet. It was therefore necessary to be able to change the focus of the lens, and also to have some arrangement for

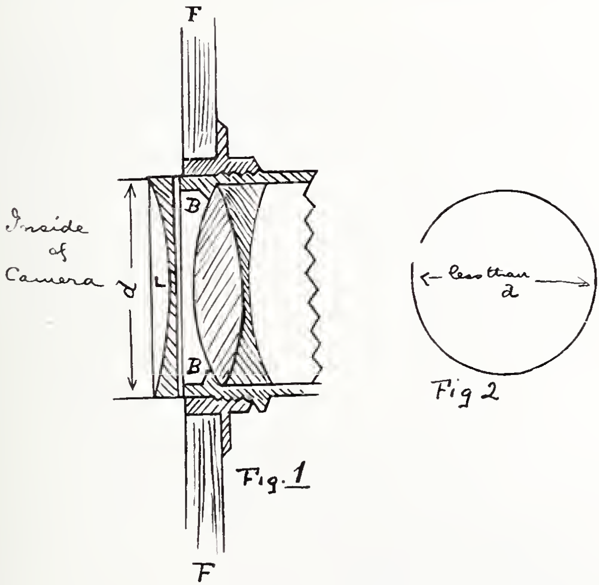


Fig. 1

Fig 2

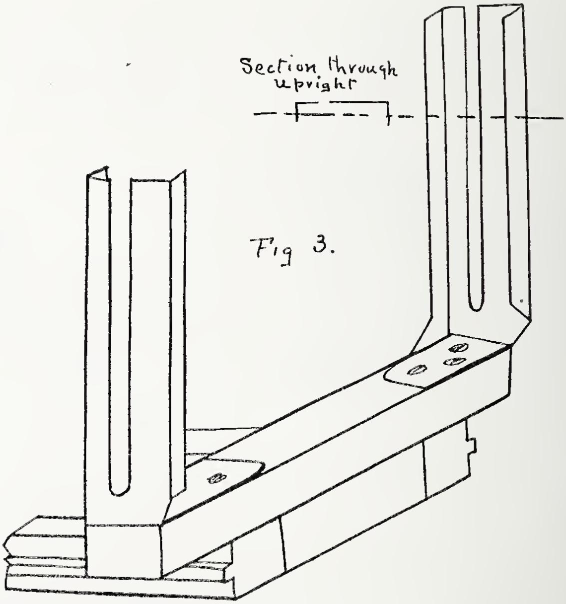
varying the position of the image on the plate, such as a double swing-back, or, better, a double sliding front of large amplitude of motion, or an equivalent arrangement.

It was simple enough to be able to change the focus of the lens by using a kit of lenses, such as can be found on the market; but the trouble of obtaining sufficient money wherewith to pay the bill soon caused the abandonment of that idea. A much cheaper scheme was that described in the International Annual for last year, and consisted in the simple addition of thin uncorrected menisci of suitable focus to the ordinary achromatic combination. The pro-

duction of good pictures by this means seemed to be so contrary to the generally accepted theories regarding lenses that the device was only resorted to after some hesitation. But the results showed that such hesitation was unwarranted, and the resulting pictures can scarcely, if at all, be distinguished from those made by the best corrected lenses.

The details of the apparatus are as follows:

The achromatic lens being of the usual style, the back of the lens-mount (marked B in Fig. 1) projected some distance beyond the front face FF of the lens-board. The hole in the lens-board was made slightly larger in diameter than the back of the lens-mount.



The lens-mount being turned in a lathe, it is fair to assume that the plane of B is centered with respect to the lenses themselves, and if the added lenses are in contact with this back of the mount the whole combination will be practically centered. Acting accordingly, menisci of the right focal length were ground to the diameter (d) of the face B, and placed squarely against the back, as shown at L. Lateral displacement was prevented by a clip of flat spring brass (see Fig. 2), bent to a slightly smaller circle than the diameter of the meniscus and of the mount, and therefore hugging the two closely

when sprung over them. This band should be wide enough to project even further back than the meniscus when in position, to prevent accidents, and any convenient means may be used to keep the added lens firmly pressed against the back of the mount.

A very curious relation was found to exist between the focal lengths in the few lenses tested with the addition of these menisci. Thus if

$f' =$ focal length of achromatic lens,
$f'' =$ focal length of added lens,
and $F =$ focal length of combination,

then $$\frac{1}{f'} + \frac{1}{f''} = \frac{1}{F} \text{ very nearly.}$$

The result so obtained did not vary more than 5 per cent. from the true focus in the lenses tested. Although it by no means follows that this simple relation holds true for all makes of lenses, it nevertheless gives us an approximate formula that may come in very handy at times.

This formula seems to be equally near the truth for negative menisci and for positive ones, the true sign of the focus being used. Thus if a 12″ f. negative lens is added to a 6″ f. rectilinear, substantially as described, the focus of the combination will be nearly 12″ ($\frac{1}{6} - \frac{1}{12} = \frac{1}{12}$). It should be remarked that with a negative added lens the back focus or draw is considerably less than the focal length of the combination.

Parenthetically it may be said that care should be taken in using these different combinations to allow for the various foci, for with the same stop and subject the exposure will vary as the square of the equivalent focus; thus, if a 6″ focus lens be doctored to 3″ focus, the relative times for the same stop will be as 6^2 is to 3^2 or as 4 is to 1, the shorter exposure belonging of course to the combination with the shorter focus.

The next requirement, that the image should have an arbitrary position on the plate, was much more difficult to solve satisfactorily, and caused most of the aforementioned sleepless nights. The double swing-back was not considered the thing for any but special cases, because of the small stop necessary to give a sharp image when the swing-back is in use. The double sliding front made too bulky a piece of apparatus, but a compromise was effected by means of a vertically sliding front and a horizontally sliding back. The arrangement is quite simple, as the original model was made with

only such tools as are found in every household, or which should be, at any rate.

The camera was of the conventional style, having swing-back and sliding front, but the sliding front had so little amplitude that it would not answer the purposes and had to be remodeled.

The camera was entirely removed from the bed, and two slotted grooved uprights screwed on the front of this bed, so that the camera front could slide easily in them, the slots serving for the admission of three thumb-screws on each side of the front, these being used to fasten it in any position to the uprights. A glance at Fig. 3 will give a much better idea of this construction than words can.

The front being thus disposed of, the back must be given our attention. This must slide horizontally in order to give the required universal motion. In Fig. 4, S, S are the two guides to which the camera body (now removed) was fastened, these guides moving back

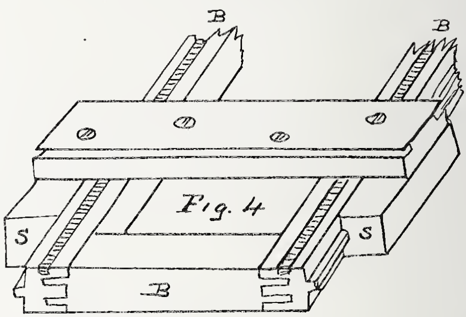


Fig. 4

and forth on the bed B-B-B by means of a rack and pinion in the usual manner. They were connected together by a flat slab of wood, slightly chamfered on its two upper edges, thus forming two longitudinal recesses in which fit the two clamps shown in the next figure, this being a view of the same completed. To the bottom of the camera body was fastened a block of wood (W), corresponding in size and position to the slab on the guides, this block being slightly recessed on the edges which touch the camera bottom, for the purpose of keeping the guides (C, C) from falling out when loose. These guides are channel-shaped as shown, and run the whole width of the camera bed, and, sliding in the longitudinal grooves shown in Fig. 4, permit the back to be placed in any position ,which does not strain the bellows too much. The back can now be fastened in the desired position by drawing the clamps C, C

ROCK OF AGES.

together on the brass plate which is fastened to the rack and pinion motion (see Fig. 4), by means of three thumb-screws acting on bolts passing completely through C, C and W, as shown in Fig. 5.

All this may be a very roundabout way of getting at the desired result, but it gives a solid construction and one not easily damaged by the vibration of the apparatus or by shocks, which is a very desirable quality in a camera to be carried on a wheeling tour.

"My friend" also has peculiar ideas regarding the method of carrying the camera, and, having much regard for his personal comfort, does not believe in carrying it on one's back, as many think is the only safe fashion. Instead of this, he fastens it to the handle-bars of the bicycle by means of one of the luggage carriers on the market, only taking the precaution to fasten the camera firmly in its box by means of a screw passing through the box into the camera; in fact, in the same way that the camera is fixed to the

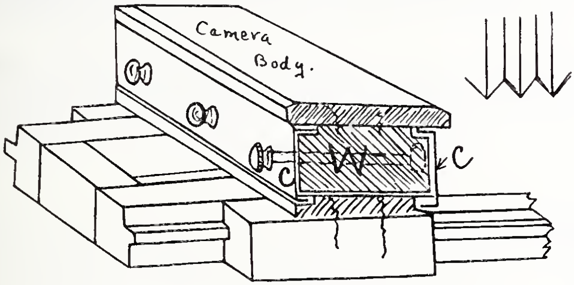


Fig. 5.

tripod-top. This prevents any vibration of the camera inside of the box. That the above method is efficacious is shown by the fact that the camera so arranged, the plate-holders being protected by three or four thicknesses of canton flannel wrapped around them to take up all lost motion, passed through a trip of several hundred miles of the worst roads in Jersey without a scratch or damage either to lens, camera or plates, not to mention the fact of having been through an upset incurred in coasting down hill, which accident played havoc with the wheel and came near doing so to the rider. In this case, a camera carried on the rider's back would not have been worth much more than old junk "after taking."

In conclusion, the readers are respectfully requested to pardon the writer for giving one or two "do's" and don'ts."

If you are looking for a "scorch" and not for pictures, take the best and levelest and most monotonous roads you can find; if vice

versa, seek the hilliest and most picturesque roads; you may have to climb some, but the chances are that you will get pictures.

From the above it follows that you should take a low-geared wheel with you and not forget your brake, nor leave your repair kit at home.

Don't be afraid to go fast because of the camera and plates. When fixed as described they will stand more than the wheel, especially if it is a pneumatic-tired one. Even the wheel will stand more than might be supposed on country roads, for, although rough, they are generally wanting in the sharp stones and bits of glass found in the vicinity of towns.

If you wish any more don'ts, take any book on landscape photography and look them up; they all apply to a photo-wheeling trip.

HINTS ON SECURING LANDSCAPE AND CLOUD FROM THE ONE NEGATIVE.

By Nichol Elliott, England.

ISOCHROMATIC plates are a great help, and, when developing, the sky portion should be brushed with water or a weak solution of bromide of potassium, so as to keep down the density.

Even when dodging in development has been resorted to, the resulting print, with certain subjects, such as the one illustrated, will not be all that could be desired, but by shading in printing a harmonious print can be secured.

An iso-plate was used for the negative from which the illustration is taken. The density of the sky was kept down with the bromide solution, but still the clouds did not print well enough out, especially when the print was on matt surface paper, and the water was too white; but by the use of the following modification of the shading dodge a good print resulted:

A piece of ordinary white paper was cut to the outside size of printing frame, was laid against the glass side of negative and an outline drawn round all the parts that required shading, keeping the line about ½″ full; all the necessary parts were then cut out and the edge serrated (serrating the edge is not absolutely necessary, but

it gives a softer result), a piece of white tissue paper was gummed on the outside to diffuse the light, and the shade was fastened by the corners with small tacks on the outside of printing frame in the

Photo. by Nichol Elliott

required position; when the clouds were thought to be dark enough the shade was removed and the printing finished in the ordinary way.

THE RIGHTS OF AMATEURS.

By Charles E. Fairman, Washington, D. C.

I SHALL not in this article attempt any enumeration of the rights which amateur photographers now enjoy. It may be that many people are of the opinion that we are now in possession of more privileges that we are entitled to. I simply intend to call attention to some of the rights of which amateurs seem to be denied, of wrongs that seem to have no remedy.

The enormous amounts expended by amateurs annually ought to convince sensible people that their trade is a valuable factor and their patronage worth cultivating. On the contrary, however, there seems to exist the impression that the amateur possesses more money than brains, that he exists to be deceived, duped and preyed upon.

I do not claim for the amateur, as a class, all of the shrewdness and acuteness that can be found in this wide world, but I do claim that

the amateur, as a rule, is possessed of good "horse sense" and is very much like other people in desiring to obtain for a dollar a hundred cents' worth of value.

It seems to be the trade presumption that worthless paper, defective apparatus and impure chemicals are good enough for the amateur.

Did you ever consider how many gross of worthless plates, how many sheets of poor paper, how many loads of defective apparatus, are unloaded on the amateurs annually? And what satisfaction does the amateur get for all this imposition: when is the right of the amateur respected?

Let me refer to some cases which have come under my observation.

A and B purchase paper from the same people; it is sold for fresh paper. A develops by floating; B develops by brush development. The results are the same—badly streaked prints, the streaks in both instances running in the same direction across the short way of the paper. The manufacturer is appealed to; his reply is not only rude, but insulting, and illustrates the theory that anything will do for the amateur. "This paper was all right when it left the manufactory," replies the manufacturer; "the prints show plainly that the paper was manipulated in trays containing hypo." In this case the manufacturer was wholly wrong; the paper had not in its manipulation been anywhere near hypo, and the worst feature of the case is that the manufacturer probably knew the paper was spoiled when sent to the dealer, but he could not neglect the opportunity to insult the amateur by insinuating that he uses hypo for everything and in everything.

Again, C purchases a 4x5 lens and naturally supposes it will cover a 4x5 plate. He finds out, however, that when photographing distant objects the lens fails to cover the plate. He complains to the manufacturer, who replies that "the lens is probably one of our single lenses, and you have probably reversed it; we will exchange it for one of our rapid rectilinear lenses on payment of $6."

In this instance the manufacturer was wrong. The lens complained of was a rapid rectilinear lens, and after the usual custom of bluffing, and insinuating that the amateur was a blundering blockhead, the manufacturer finally changed the lens for one that would cover a 4x5 plate.

Again, D starts away on a summer vacation and carries with him a supply of films. He finds upon his return that the films are

PHOTO BY D. L. ELMENDORF.

TEMPLE OF NEPTUNE, PÆSTUM, ITALY.

PHOTO BY D. L. ELMENDORF.

INTERIOR, TEMPLE OF NEPTUNE, ITALY.

worthless and his money and time have been spent for nothing. He naturally feels indignant and writes to the manufacturer, who replies:

"Sir—The emulsion was carefully tested before the films left the factory. We think from your description of your negatives that you failed to remove the cap from your lens when making your exposures."

How long is this to continue? For how many years shall we be swindled with paper that fades, paper that streaks, paper that turns yellow and green until we think color photography is near at hand? How often must we be insulted by such childish excuses as "hypo," "uncapped lenses," and "reversed lenses"?

But where is the remedy? If a butcher sells us spoiled meat we prosecute him; if a grocer sells us damaged provisions we trade elsewhere; if a merchant sells us "shoddy" we find some place where we can get a fair value for our money. It seems that the only remedy that we can hope for at present is in using our influence in letting other amateurs know of instances when manufacturers refuse to replace the worthless and damaged articles with perfect ones. The manufacturer who refuses to do this, who persists in his insinuations that the complainant is a blundering idiot who spends his money in purchasing lenses to reverse them, or in purchasing paper for the purpose of developing it with hypo, ought to be let severely alone, or, what is better, he should be publicly recommended for a boycott by all amateurs.

All we want is fair, honest treatment; this is our right.

PHOTOGRAPHY IN VACUO.

By Victor Schumann, Leipzig, Germany.

IN the year 1890 I made the observation that the light from a hydrogen tube has a very energetic action upon photographic plates if the exposure takes place in a vacuum. The atmospheric air has to be kept at a distance from the active rays, as even layers of 0.1 millimeter thickness will hold back and retain the greater part of all hydrogen light.

During the years 1890, 1891 and 1892 I investigated this peculiarity of hydrogen light, which, it may be remarked, is only possible in a spectroscopic way, and obtained distinct lines for only a

short distance. Further away towards the refractive end the sharpness of the lines declines visibly and the most refractive lines resemble vanishing strips. Altogether I distinguished at one time fourteen well-defined groups. From the considerable richness of lines of the sharpest of these groups I estimated the number of lines of the whole district at six hundred. This, of course, was done under the supposition that later on, with the aid of an improved apparatus, I would be able to dissolve fully the whole district, as I had already accomplished with a less diverted part.

In 1894 I reconstructed the apparatus used before to suit this purpose, and improved also the ultra-violet sensitive plate which was intended for the exposure. In this way I have been able to photograph the spectral district much more sharply than before, and increase its extent towards the wave length null considerably. With the improved method of resolving, the number of lines has considerably increased. My former estimate of the line number of hydrogen has now, when I have been able to investigate only the smaller part of the district, proven to be much too low.

The spectral district in question I have, on the other side of A. E., divided into eight districts of three dozen each, to which a ninth may be added as soon as I give the marginal rays more time for action than before. At present I have only three of these districts clearly delineated. The richness of rays is best shown by the following: The part which is richest in lines shows at a length of thirteen millimeters more than three hundred and fifty lines, and in all three districts taken together I count seven hundred and fifty; that is even more than I formerly ascribed to the whole district. Judging from this, I believe that I am not far out of the way when I estimate the whole number at fifteen hundred to two thousand, instead of six hundred as heretofore,—an astonishing quantity of light for which one must regret that there is at present no technical application. The extension of the hydrogen spectrum is of interest only to the spectroscopist; but to him it is of considerable value, for, from my observations made during 1894, the conclusion may be reached that, like hydrogen, nearly all other substances emit powerful light masses on the other side of wave length 1852 A. E.

To get an idea of the importance of this new fact it is sufficient to remember what a change the discovery of the ultra-violet to wave length 1852 A. E. (Stokes) made in spectroscopy. Without knowledge of the ultra-violet we would have to renounce a great part of our spectral knowledge acquired during the last two decades.

We must also add that the more limited the district of observation is the more liable are we to make errors in our spectral speculation. We may consider only how many so-called conclusions derived from the visible spectrum have become fallacies with the more careful investigation of the ultra-violet.

Similarly, the spectral district lying on the other side of the ultra-violet will in time clear up many of our present ideas and enlarge our spectroscopic knowledge. This is to be expected just in proportion as we approach the new district of wave length null. This may particularly be said of all efforts directed towards an increase of our knowledge on molecular movements. Norman Lockyer says, and with perfect truth, "Our knowledge of atoms will be incomplete as long as we do not know the oscillation of the extreme (invisible) red, to the extreme (invisible) violet end of the spectrum."

ABOUT PORTRAITURE.

By John A. Tennant, New York.

MANY operators work on the theory that brilliancy in negative-making depends upon development. This is perhaps the result of an overdose of demonstrator. In portraiture, brilliancy must be secured by a right disposition of the light during the sitting. Contrasts produce brilliancy, but they must be delicately managed or the effect will be crude and violent. The happy medium depends chiefly upon the subordination of the half-lights to the high-lights.

For artistic effects in the strongly lighted style now coming into vogue, see that the background and accessories retire from the subject, and that they balance the main lights by rich, deep shadows.

As a rule the most pleasing portraits are those taken with the camera a little lower than the face. Finer gradations of light and better illumination of the shadows are obtained in this way.

When sitters who have no grace of form present themselves, such as the average man in conventional costume, or women of ungainly proportions, the lack of grace may be softened and made sometimes to wholly disappear by the use of a dark ground, or the massing of shadows about the lower part of the subject, relieved only by semi-shadow.

Children's pictures should be generously lighted, and in the majority of cases women's heads will bear plenty of light; but men's heads are best treated broadly, with bold lights and shadows suggesting strength. Old people, men and women, require an abundance of diffused light to soften the heavy marks of time. For white hair, shade the top of the head with a hand screen. Of course there are exceptions to these, as to all other rules.

Mannerism, a style peculiar to the individual, is often condemned; but in photography, if you can get the right manner, it pays well. There is a distinct mannerism about the work of Falk, Anderson, Sarony, Breese, Mendelssohn and many of the leading portrait workers abroad. One can recognize the man instantly in the work. Learn to do thoroughly good work first, then specialize in one distinct style.

Photographers working under the skylight day by day the year round often lose sight of the fact that light—its superabundance, concentration, diffusion, etc.—strongly affects certain temperaments. Some people, forced to remain in a strongly concentrated light for a few minutes, become irritable and restless; others may be raised from depression to enthusiasm by moving them from comparative shadow into bright light. These indications should be watched for. Make the sitter comfortable as far as the light is concerned, if you desire a successful portrait.

A few years ago, at the Washington Convention, Mr. King described a method of studying lighting the sitter which is well worth the attention of ambitious operators. He drew a large circle on the floor of his studio, and marking certain points on the circle, posed and lighted a model at each point consecutively. This experiment was repeated at intervals, and the resulting negatives so studied that the operator was perfectly familiar with the effects of light obtainable at given points, and it was easy to apply this experience in actual work. This method, as a profitable occupation for spare hours, is as useful as anything I have yet seen suggested.

A MAGIC DOOR.

By Dudley C. Hasbrouck, Peekskill, N. Y.

THE practice of photography is a magic door that opens to those who know its secret, into not one room only, but into many varied and beautiful apartments. But not every one who pulls the black cloth over his head and gazes with delight on the inverted images spread upon his ground glass has learned the mystery of the door.

Fortunate indeed are those who have found it, and who at first, with timid, hesitating footsteps, have entered these wonderful chambers, and who afterward, with bolder tread, have explored their ever widening recesses.

But who can adequately describe these apartments? Surely not he who, like myself, has but caught brief glimpses of their mystery through the partly open door, as some more earnest and enthusiastic comrade has passed the portal. And yet these glimpses have given me a faint idea of the many different interiors.

One, I remember, seemed like a laboratory, for I saw tables covered with innumerable curiously shaped glass instruments, with vessels partly filled with colored liquids, and with many well-thumbed ancient and modern volumes, while my nose was assailed with a mixture of odd and pungent odors ere the door closed.

Another, perhaps, was a portrait gallery, for the walls were nearly hidden by pictures, in different-sized frames, of beautiful women, noble-looking men and bright-eyed, laughing children, while one end was apparently roofed with glass and filled with white screens and painted backgrounds.

That one, however, the glances into whose interior most charmed me and have almost led to my seeking to gain the "open sesame" of the door, is, I am certain, an immense park or garden. I have caught views, I know, of sunny meadows and misty hill-tops, of dim forest glades and silvery streams, of blue skies, snowy clouds and masses of green foliage which woke strong desires in my heart. Surely, I said to myself, they must be happy mortals who wander through those shady paths and rest beside those gleaming waters.

There are other rooms, too, of which I have received only the vaguest hints, but within whose walls are found the most delightful and interesting surprises, and yet how many there are of those who

set up their tripod or press their button with never a desire to accept this magic door's continued invitation.

Reader, are you among their number? I sometimes fear I am.

THE MICROSCOPIC STRUCTURE OF VEGETABLE TISSUE. . . . .

By Maximilian Toch, New York.

ACCORDING to all the works on botany, the structure of plants consists of one framework of cellulose, and each subdivision, generally known as a cell, is filled with living matter or protoplasm, the center of which contains the nucleus. An analogous condition was supposed to exist in animal tissue until Dr. C. Heitzman proved it to the contrary. He wrote a most efficient work on the subject, contained in the volume on Microscopical Morphology. In 1890 Dr. Heitzman deputed me to establish the theory of the reticulated structure of plants, and after I had assured myself that plant structure and animal tissue were of similar nature, I determined before establishing my discoveries to photograph them with the same high powers that I viewed them. This I have described in various periodicals, but it may be of interest to note that comparatively novel methods of photo-micrography had to be resorted to in order to photograph as finely as the eye could see while viewing the object with the continual twist of the micrometer screw. For illumination of the 1-12 objective and inch periscopic eye-piece I have abandoned all artificial lights and have resorted to sunlight with perfect success. The diaphragm must be contiguous to the slide, and the size of the diaphragm is not larger than an ordinary pinhole. It is a logical inference that the 1-12 objective diaphragm cannot be as large as the aperture of the lens itself. In an ordinary view lens, to obtain distinct sharpness the diaphragm is many times smaller than the diameter of the lens. The same rule applies to microscopic objectives. The diameter of the 1-12 with which I have taken the accompanying illustration is not more than 1-16 of an inch in diameter; therefore, to obtain sharpness, the diaphragm accompanying this must be many times smaller. Microscopes generally are not made with the diaphragm adapted for extreme definition. The focusing screen

should not be made of ground glass, but of barium sulphate precipitated on and in a gelatine film. The microscope and camera should form one solid system, so that a slight jar has no effect on any one portion. The same should be true of the condenser, which for ordinary sunlight illumination can be of the bull's-eye pattern. The methods of staining vegetable tissue are also to be taken into account, as the basic anilines produce false deposits, inasmuch as the aniline combines with the tannin which is contained in a great many plants and vegetables. I therefore use entirely azoaniline stains, which are not affected by tannic acid.

Eagle orthochromatic plates in conjunction with an aurantia screen I find the best adapted for photo-micrography. As evidence that my method of photo-micrography is correct, I refer to the section of the tomato peel, which shows two layers of cellulose, both in different planes and both equally sharp. The other illustration is the time-honored specimen of spider legs, showing the comb (Smaragdina micrommata) x 200 taken with a 2-5 objective. The striations in the teeth of the comb, which are barely visible to the naked eye, are plainly seen. The upper ends of the capillaries, which appear double and out of focus, are so in nature.

NEW PHOTOGRAPHIC STUDIES.

By John W. Sanborn, Smethport, Pa.

IN searching about among the N. Y. Indians for new and strange subjects at which to point my camera for the purpose of contributing another article to the International Annual, at the editor's request, I came upon things wise and witty; and my researches have convinced me that the Indian is naturally a wag despite his reputation for stolidity.

The Indian has a burlesque for almost every foible of the human race. He particularly abominates the man or woman who pries into other people's business. The accompanying engraving represents a burlesque of a nosey man. The mask is made of cloth. The nose is solidly stuffed and pushes into everything. The mouth has an extremely inquisitive twist. The eyes are contracted as if piercing their way into very small places, and altogether the burlesque is complete.

During the month of August the Indians gather in great numbers to celebrate the "Green Corn Feast." The green corn dance, performed on such occasions, is unique. After thanking the Great Spirit for the delicious sweet corn, they proceed to the dance. Each dancer wears a corn-husk mask. The engraving shows two of these which have been used again and again in the dances. Corn

Photo. by J. W. Sanborn.

husks are split into narrow strips and braided. These braids are coiled and fastened with thread. Three of the coils make up the eyes and mouth. A corncob covered with a husk is fastened between the eyes to serve for a nose. A fringe of split husks around the face completes the mask. There is some expression to these

faces, but not much, and what there is, is ludicrous in the extreme, and yet, in all seriousness, the Indians wear these and perform their solemn religious dances. After the dances they regale themselves with hot succotash, which is one of the greatest delicacies I have ever tasted, and which is prepared in this wise: green corn-husks are spread out on a large wooden platter and fastened to each other in the center of the dish. The well-seasoned corn and beans are

Photo. by J. W. Sanborn.
CORN-HUSK MASKS.

poured upon the husks until the platter is nearly full, then the outer ends of the husks are gathered up and tied, and the whole mass is boiled till done. It is then removed from the kettle and laid on the platter, the husks are cut apart and the feast begins.

The pride of the Indian heart, next to a dog, is a genuine buckskin coat. In the engraving two such coats are shown, made of buckskin tanned in smoke by Indians.

EXPOSURE.

By Raymond Lee Newcomb, Salem, Mass.

I KNOW of no more important portion of photography upon which to write than exposure. This much-talked about subject is always apropos because of its great importance. By it the after-results must surely be measured. I realize how much a negative may be "tinkered," but the correctly exposed plate is such a satisfaction. How it "comes up," how the creamy surface yields from out its stoical countenance those beautiful and rapidly darkening patches and lines of lights, shadows and half-tones, until, being carried far enough, you hold it up before your developing light and thence to the magical embraces of Madame Hypo. From the wiles of this latter, at times erratic factor in the life of that one result we all desire, *i. e.*, our masterpiece, the negative is taken to the washing, by which means, properly performed, even Hypo is forced to confess herself defeated by simple aqua pura. How our heart bounds as, calling our friends, we view the final results! Truly "Solomon in all his glory was not arrayed like one of these." See the details in those trees! See the life in those high-lights! See how delightfully the exquisite half-tones blend light and shadow on hill and dale into a—no, alas! not perfect whole, for even nature, as seen on the ground glass, is not that; but yet our result is fine—if the exposure was correct. Old enough to be less a crank, presumably some will remark, yet I fancy the person without a hobby is oftener "a little off" than he or she who has one, especially if it be photography, used as a means of trying to perpetuate nature and the beautiful. I speak, of course, now of outdoor work, where exposure is so vital, and this brings us to shutters. I have not seen one which meets my idea. Thornton Pickard does not, nor do the Bausch & Lomb or Prosch. The B. & L. starts and closes from and to a center. Distance gets the same time as foreground; middle ground gets the most, so far as I can see. Distance frequently gets an overdose if we have correctly exposed the other portion. Ortho-plates help us out some, so do non-halation, but the shutter yet seems faulty, though I have obtained some most pleasing results with one of them. The principle of the Prosch seems to give more exposure on the inverted or to be top-side of the negative. Hence tree-tops and distances get seemingly the longest time to the light through the lens, and gener-

ally with tree-tops and also chimneys and spires over-exposure shows itself when objects in a plane with the camera are lighted quite properly. I have sometimes thought the time might come when we should have plates so coated as to be slower in those portions where trees and chimneys come, and faster in the other parts, and so equalize the light distributed. Feats have been performed, and may be again. Remember how the mother of James Watt chided the boy. We amateurs ask pardon if too presumptuous, even if some others do quote of "fools walking where angels dare not tread." I feel certain that photography will, in fact must, to maintain its position as an art-science, make many strides yet. The matter of lenses is also of deepest concern, so is focus. Give me a lens that will "cut"; I'll get "fuzzy types" enough then. Make the imaginative picture à la Rembrandt if you desire them, but for myself I do like a clear, keen lens, with another link to let out if required. In conclusion, I doubt not the makers of apparatus try to suit at least the majority, but the kodaks of to-day remain to my mind in one respect as faulty as ever in matter of view-finders. They are too small, and the point has been seized and improved upon in the Carlton Twin Camera, which, though bulky, is on the right track excepting the price. This it would seem might be lessened if the view-finder lens were of a less expensive sort. Manufacturers must remember that we amateurs are rather looked down upon professionally, and consequently, in a spirit of mild retaliation, we claim the right to use a free-lance sometimes. One thing is sure, but for love of this fascinating study, which with most of my kind is outgo rather than income, those in it for money would not have as many experimenters to assist them as is now the case. I have written "al fresco," so please pardon me. I love the science and its mysteries.

THE FINENESS OF SCREENS FOR HALF TONE WORK.

By Alexander C. Angerer, Vienna, Austria.

It is generally acknowledged that autotypy (half-tone relief etching), as soon as it was possible to obtain a faultless original lined plate for taking the necessary lined negatives, and to bring the extremely clear negatives, thus produced, on the metal plate by the so-called direct-printing, without any soiling of or injury to the picture, was brought immediately to

a state of unexpected excellence. Instead of the gelatine transfer printing process, which was in general use before these improvements were brought out, we are to-day in a position to execute much finer etching on zinc or copper than before, and it was therefore but natural that the manufacturer should aim to produce screens of extreme fineness. Line negatives are to-day made and used that show a fineness of 200 lines to the inch. The question now arises, whether the supposition is correct that a picture with such an extremely fine and close screen is, under all circumstances, also richer in details and softer in gradation. As shown practically, the difference between views made with coarse and medium nets is enormous, but between the medium and those with the finest network there is hardly any advantage for the fine ones. This can only be explained by the following:

In a correctly made half-tone plate, whether etched on copper or zinc, the lighter tones, and especially the high-lights, should be formed by as many as possible small black dots. With regard to these small dots it is a matter of indifference which screen was used. The photographer and etcher will always endeavor to point these dots as finely as possible to increase the effect of the picture. The consequence can therefore only be that with every plate, no matter whether produced with a fine or a coarse net, the dots in the lights mentioned will be of pretty nearly the same size.

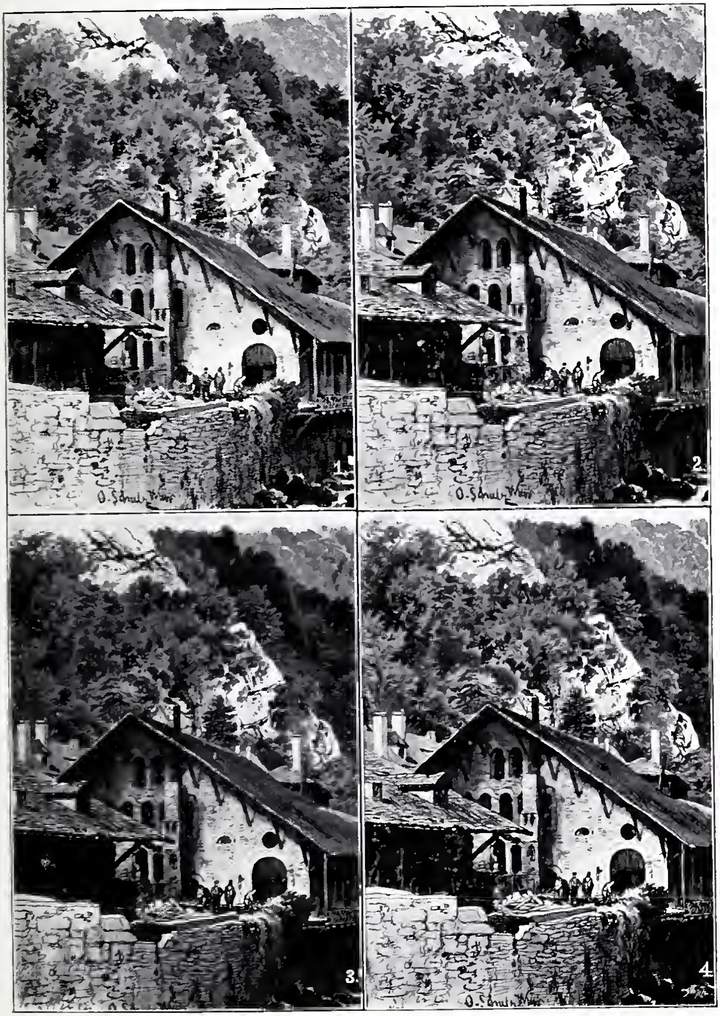
But as infinitely more such dots appear spread upon an equal surface of a fine line negative, this will lead to a darkening of the light surfaces, which will easily take on a hazy character. In certain pictures this may sometimes add to the general effect, but when India ink drawings or sunny views from nature are in question, such a fine line plate has a disturbing effect. The accompanying cut will confirm my remarks.

No. 1 is made with a coarse screen of 120 lines to the inch, and shows therefore to disadvantage as compared with No. 2, which has 150 lines to the inch.

No. 4, on the contrary, with 175 lines, shows no particular advantage when compared with No. 2.

To prove that even the finest screen, with incorrect exposure, will displace the picture to such an extent that it will look as if placed behind bars and will be minus all sharpness, I have added No. 3, with likewise 175 lines.

Long practice, conscientious labor and the best outfit are neces-



Illustrating article "The Fineness of Half-tone Screens," by A. C. Angerer.

sary conditions for uniform and good results. Finally, I would remark that the sample half-tone is etched on zinc and was not retouched, being intended for demonstration purposes.

ON THE PLEASURES OF BEING CAMER'LESS.

By H. Valentine Knaggs, London, Eng.

WHEN one has been carrying and using a camera for the best part of one's lifetime it is not altogether a bad idea to leave it at home for once in a way. That is what Lewis Carroll, who wrote that charming book called "The Hunting of the Snark," would style being caminus or camer'-less.

There are times in the life of any photo-hobbyist when it is a positive relief to him to refrain from inflicting his picture-making machinery on a long-suffering but withal indulgent public.

The worst of it is that when one does leave a camera at home, circumstances will surely compel one to feel sorry in regard to the opportunities which have been lost.

Possibly that is the reason why the best subjects nearly always crop up on Sundays. One "Sunday kodaker" whom I know, a veritable desecrator of the "Sawbath," told me in confidence that he always got his best effects on that the first day of the week. He also averred that Sunday work, although result-bringing, was frequently followed by disaster as far as the coming week-days were concerned. In spite of that, so he stated, the habit had grown on him and he felt a great hesitancy in relinquishing it. I cannot assert that I exactly agree with his opinion, but he certainly spoke very positively.

If, by refraining from Sunday work, one misses so many golden chances, what must be the effect on the individual who ceases from photographic work altogether during the brief respite, which the world concedes to him, of gaining his daily bread in a smoky town?

Here was I during the past summer located at a pleasant village on the Yorkshire moors, a district literally boiling over with old abbeys, pretty picturesque cottages and mansions, with hills and dales and lovely forest, and I am sorry to confess that I was minus my camera—"caminous."

The reader might want to know the reason for this apparent backsliding on my part from a beloved art. It is just this one thing: I wanted a spell of complete rest and quietness on that particular occasion, and so I did not relish the idea of working hard in seeking out appropriate subjects and objects.

I was equally unwilling to go in heavily for developing and printing on my return, and thus it came about this year that, while sadly missing my old companion, my holiday was a camer'less one.

COLORED TRANSPARENCIES.

By H. Crisp, Ballarat, Australia.

THE following directions for the production of transparencies ranging in color from black to deep red, at a minimum of expense and trouble, will, I am sure, be of interest to many who, like the writer, have grown tired of the same unvarying tone which nine out of every ten amateurs make their lantern slides. With the ordinary commercial lantern plates a great variation in color may be obtained, with suitable exposure and development, but none that I have yet tried work so well and give such striking and beautiful results as some home-made plates prepared as follows:

The formula for emulsion is one given by Professor Spencer B. Newbury, of Ithaca, N. Y.

Nelson's No. 1 gelatine	123 grains.
Distilled water	10 ounces.

Allow this to soak, and then dissolve by placing vessel containing it in hot water, heating as little as possible. When dissolved, add one dram of a one per cent. solution of hydrochloric acid (made by adding one part acid to one hundred of water). Pour the acidified gelatine solution into a large stoppered bottle. In the dark-room add 500 grains of nitrate of silver in crystals and agitate till dissolved, then add 386 grains of potassium bromide in crystals and dissolve. 154 grains Heinrichs hard emulsion gelatine are then soaked and drained from excess of water and melted. Into this the emulsion in the bottle is poured (in the dark-room) and the whole well mixed.

The emulsion must now be allowed to set to a jelly and is then

forced through coarse canvas (so as to reduce it to shreds) and washed for an hour or so in running water, care being taken that no light except the usual dark-room illumination is allowed to reach it. 154 grains more of the hard gelatine is then soaked and dissolved, and the emulsion, which has been thoroughly drained, is added thereto and the whole thoroughly incorporated at a temperature not exceeding 120° F. One and one-third ounces of alcohol is now stirred in and the bulk made up to 20 ounces (if not that already) by the addition of distilled water. It is now allowed to set, and improves by keeping two or three days before using. The glass to be coated must be well cleaned by any of the usual methods, and should be warm at the time of coating, to promote the regular flow of the emulsion. After coating and setting on a cold slab, the plates are placed in the drying box and should be ready to remove and pack in 24 hours.

These plates are very slow, slower in fact than the usual lantern plates.

For cold black tones expose 8 to 10 seconds with an average negative one foot from gas-burner, and develop with metol developer as under:

No. 1.

Metol	40 grns.
Soda sulph.	7 drms.
Water	8 ozs.

No. 2.

Carb. Potassium	120 grns.
Brom. potassium	48 grns.
Water	8 ozs.

Use equal parts.

For warm black tones give same length of exposure, but develop with the following:

A.

Hydroquinone	64 grns.
Soda sulph.	6 drms.
Potassium brom	12 grns.
Water	8 ozs.

B.

Soda hydrate	64 grns.
Water	8 ozs.

Equal parts to be used.

For tones ranging from violet to deep red or crimson, increase the exposure in the first case to 3 or 4 minutes, and add to each ounce of above mixed developer 3 grns. ammonium bromide and 3 grns. carbonate of ammonium, or in the second case expose 6 to 10 minutes, and add 6 grains each of the ammonium bromide and ammonium carbonate.

By varying the exposure between these periods and also the amount of the two chemicals added proportionately, the resulting colors will differ. It is well to over-develop in the case of prolonged exposures and then slightly reduce, so as to thoroughly clear the high-lights, which would otherwise probably have a slight deposit on them.

COLLODIO-CHLORIDE OF SILVER PAPERS FOR VERY FLAT NEGATIVES.

By E. Valenta, Vienna, Austria.

IT is known that most of the emulsion papers on the market print considerably harder than albumen paper, and are therefore more suitable for certain negatives, the same as albumen paper. It often happens in amateur circles that in consequence of unfavorable conditions at the time of exposure, defective development or the like, negatives are obtained which are very foggy, and so flat that is is not possible to make a really good print on the ordinary celloidin or aristo paper.

If a strip of very hard printing emulsion paper is exposed under any paper scale photometer, and if this is repeated with albumen paper, it will be found that the number of distinguishable tones of the former is small as compared with the albumen paper.*

The shorter this scale, which we will call circumference of gradation, the more flat and foggy may the negative be from which useful prints may be obtained. If, therefore, an emulsion is to be prepared for very flat and foggy negatives, a medium has to be found which lessens the circumference of gradation without injury or hindrance to the strength of the print.

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* See my article, "The examination of emulsion papers for the printing-out process," Photo. Corresp., 1895, May.

Such a medium we now have in chromic acid and its salts. After many experiments on the making of collodion papers I can recommend the following emulsion:

Collodion ($2\frac{1}{2}$ to $3\frac{1}{2}$%)	1000 cc.
Strontium chloride	1.8 grams.
Lithium chloride	.9 gram.
Glycerin-alcohol*	20 cc.
Citric acid	5 grams.

Put the collodion into a glass-stoppered bottle, dissolve the lithium and strontium chlorides in a glass beaker in a very little diluted alcohol, and add this solution to the collodion. The citric acid is finally dissolved in the glycerine and alcohol and is added to the mixture.

The following solution should then be prepared:

Silver nitrate	32 grams.
Water (hot)	20 to 30 cc.

And this is added, in the dark-room, to the collodion, drop by drop, with continued shaking. The collodion may be filtered through a cotton-tuft if necessary.

The emulsion thus obtained is ready to be applied to paper, after standing for several hours in a warm place and filtering. Such paper, printed under a Sawyer scale photometer, gave fourteen to fifteen degrees, which could be well distinguished, and showed also a sensitiveness four to five times that of albumen paper.

If 200 cc. of this emulsion are mixed with 0.2, 0.4 and 0.8 cc. of a ten per cent. chromic acid solution or equivalent quantities of calcium or ammonium bichromate solution, emulsions are obtained which are colored more or less orange-red, and which give collodion papers, the gradation in which is smaller according to the quantity of chromic acid added. With 0.8 cc. of chromic acid the gradation was only six degrees. Such an emulsion is therefore suitable for the production of collodion papers, which, with even very foggy and flat negatives, give prints that are satisfactory. It must be remarked, however, that these emulsions, with the increased chromic acid quantity, become always less sensitive, so that the above emulsion,

* Equal parts of 95 per cent. alcohol and pure glycerin.

with 0.8 cc. chromic acid, possesses only one-sixth the normal sensitiveness. It should also be stated that combined baths work best with these papers. I use the following:

Lead nitrate	10 grams.
Hypo	200 grams.
Water	1000 cc.

To each 100 cc. of this durable stock solution, which before using must be filtered, 5 cc. of a one per cent. chloride of gold solution are added. Prints on these chromic collodion papers will bleach considerably in this bath, making it necessary therefore to print very deeply indeed, until the picture has almost a burnt-in appearance. They are put at once into the combined bath, in which the whites will become pure in a few minutes. Toning proceeds rapidly. With such paper, brilliant and strong pictures may be made from very flat negatives, and for such purposes it will be found useful.

ORTHOCHROMATIC NON-HALATION PLATES.

By J. Gaedicke, Berlin, Germany.

PHOTOGRAPHY is a modern science, originating at a time when the human intellect in all its spheres had already made no little progress, and which has ripened to a high state of perfection at the present time. Is it not therefore astonishing that two of the most important improvements in photography exist and have existed for years without having met with general application? We allude to the orthochromatic and non-halation plates, or, in other words, to orthochromatic non-halation plates. Orthochromatic plates have been known for about ten years, and yet to-day some scientists of reputation deny their usefulness, and assert that with screens of suitable color the same results can be obtained with ordinary plates as with orthochromatic plates. They do not take into consideration, however, the fact that the time of exposure will be so prolonged as to make the method impracticable. The ordinary plate does not give the correct value of the natural colors, and we fail therefore to understand why orthochromatic plates are not generally used, because if they are not absolutely correct they do give at least approximately correct color values.

If any one will take the trouble to make two views of the same landscape, a view including plenty of foliage, one immediately after the other, one on an ordinary and the other on an orthochromatic plate, he must be convinced, if his exposures were correct, that the orthochromatic plate is superior to the ordinary plate; and if one can be so easily convinced of this advantage, why is it that ordinary plates are used for landscapes in preference to orthochromatic plates? The same applies to portraiture, though the difference here is much finer and not so striking. In this case we find even more opposition among professionals.

As with orthochromatic plates, so it is with non-halation plates. If two views of a landscape are made against the light, with the foliage showing in relief against the sky, the difference must readily be seen. In this case we are accustomed to see the foliage illuminated in such a way that near the sky it appears of a very light tone and bare of all delineation, being in no way true to nature and not corresponding to what is seen with our eyes. The eye notices this illumination to a certain degree, but only the illumination by diffusion of light, not the halation of the plates, which originates, as has been proved, by reflection of light from the back of the glass plate. Two views taken as above will prove that any non-halation plate depicts the foliage as a sharp silhouette against the sky, and the illumination by the diffusion of light, which is also impressed upon the eye. Such results should induce every landscape photographer to use non-halation plates. If the same test is made with a portrait, it will be seen by comparing the negatives that halation exists in every ordinary plate, influencing considerably the correctness of all light tones. On the negative taken with non-halation plates the tones are clear and well defined and give good modeling; whereas, on the ordinary plates, they lack definition and character, due to reflection from the back of the glass.

We would recommend therefore the use of no other plates but non-halation plates which have been rendered orthochromatic.

HALF-TONE WORK.

By C. Gravier, Paris, France.

IT is known that in order to transform a photographic image into a typographic block it is necessary that this image of continuous tones shall be split up by lines or dots after the manner practiced by engravers. The method known as the American method, employed to produce this effect, is by placing a lined screen in the camera at a certain distance, say two to four millimeters, in front of the sensitized surface upon which the negative is to be made; this serves to give the typographic plate after one or other of the following methods:

First.—The Enamel Process.

A copper sheet of from one to one and one-half millimeters is taken and coated with the following composition:

Le Page's fish glue.............	10 grams.
Potassium bichromate	3 grams.
Water	100 cc.

(Instead of Le Page's glue, gelatine which has been turned into meta-gelatine either with ammonia, oxalic acid or sulphuric acid, may be used.) The plate is slightly warmed to hasten the drying. It is then exposed behind the negative for about two minutes. The bichromatized glue not modified by the light is carried off by washing in water. The plate is then warmed until the modified gelatine assumes a brick-red color, when it is allowed to cool, and the back and borders of the plate, which are not to be engraved, are covered with a coat of bitumen dissolved in benzine. The plate is placed for one-half hour in a solution of perchloride of iron of strength 42 degrees Baumé. It is then washed in plenty of water, and the plate thus engraved is ready to be mounted on wood to the height of the type.

Second.—Carbon Process.

This process is similar to the single transfer carbon process. The paper usually used to obtain red tones, or any paper of light coating, is sensitized in a 3 per cent. solution of bichromate. It is then exposed behind the negative, and the photometer can be dispensed with by following the appearance of the image similarly to the print-

ing of paper sensitized with silver salts. When the print is finished, the paper is placed in water, and when the coating is very soft and supple the copper plate is plunged into water and the coated side of the paper is applied to it. Both are then removed from the water and the paper is squeezed into close contact with the copper. The whole is then placed between blotters, and a heavy sheet of glass is then placed on top, being kept in position with a kilo weight. Afterwards the plate covered with the coated sheet is placed in water warmed to about 45 degrees. The paper is detached when the gelatine runs at the edges, the washing of the image being done in water at 45 degrees, then 30 degrees, then 20 degrees, and finally it is washed in water at 15 degrees. In this state the copper plate is covered with points more or less heavy in accordance with the tone, which points give the design. The copper is bare between the points in the bichromated gelatine. On covering with a 3 per cent. bitumen solution the parts which are not to be acted upon, the plate is placed for one-half hour in a solution of perchloride of iron of strength 45 degrees Baumé.

The last process is the easiest for the amateur, as it only requires very few tools and readily gives superb results.

THE HORIZON LINE IN EXACT PHOTOGRAPHY.

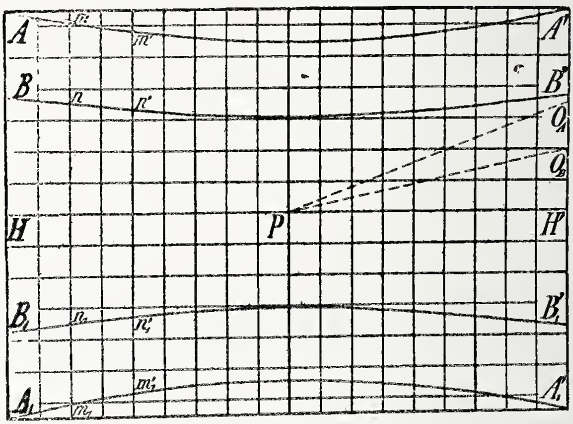
By Le Commandant V. Legros, Paris, France.

IN view of the astonishing results which have crowned the application of the photogrammetric method by the geographical surveys of Italy and Canada, one cannot but evince some surprise, at first, at the little consideration that this method has received up to the present from the other civilized powers. The mistrust of which it seems to be the object can perhaps be explained by the fact that, for the complete knowledge of the method, it is indispensable to possess scientific acquirements of an order quite different from that which is usually united with the same subject, which latter includes geodetics, optics and perspective.

To whoever is satisfied to apply the method with some confidence we have easily been able to demonstrate in our "Elements de Photogrammétrie" that the measure of this really indispensable know-

ledge can be reduced to the most elementary notions, within reach of any able scholar of the primary schools. It was entirely different as to creating the method. It is entirely different, even to-day, for those on whom the responsibility should rest of introducing the processes of this method in the technics of the great official geographical institutes.

For this reason there has been over half a century, when the great intuitive power of Arago had simply discerned that therein was something to do. Captain, at present Colonel, Laussedat, to whom these two sciences were alike familiar in the highest degree, was able at the outset to constitute the method, and from the start he carried the work to such a state of completion that, as excellently said by Mr. G. Deville, Surveyor-General of Canada, nothing essen-



tial has been added since then. It is because these very sciences, though taught in the higher technical schools, have been more or less neglected by the majority of surveyors, even those of the highest standing, that the chiefs of geographical surveys of so many nations still hesitate to assume the responsibility of adopting a method the importance of which escapes them.

The motives for this hesitation become but too evident when one runs over the writings of the surveyors who have treated of photogrammetry, or simply the resume given by Dr. Eder (Ausführliches Handbuch der Photographie) of a certain number of these works. Among other statements emanating from this lecture one can remark that almost half of these learned men consider the determination of the horizon plane as sufficiently assured when, in the rotary

movement of the apparatus over a horizontal plate, the image of an exterior point, supposed fixed on that plane, successively forms itself at the bottom of the two notches made on the vertical borders of the ground glass frame at the two extremities of the same horizon, and designed to figure as the two extremities of the horizon line. Nothing, however, can be farther from the truth. From the time that the rotation of the apparatus takes place on a really horizontal plane, every exterior point gives an image which fills these conditions perfectly. It is on displacing this image in the interval of these two points that one can form a correct judgment. In this rotary movement the image clearly defined in every point situated on the horizon plane of photographic perspective effectively traces on the ground glass, supposed to be vertical, a straight horizontal line which is precisely the horizon line of this perspective. The image of every point not situated on the horizon plane traces on the ground glass a curve of a hyperbola, having for axes of symmetry the real horizon line and the real main vertical of this perspective. Therefore as soon as the axis of the objective perpendicular to the plane of the ground glass meets this glass in any point of its vertical, the two intersecting points of any of these hyperbolic curves with the vertical borders of the frame will be situated on the same horizon.

The only way to establish the distinction is to follow the displacement of the image of the point considered relatively to the entire extension of the horizontal corresponding to the ground glass. To this purpose this glass must have at least a very finely traced horizontal over all its extension, or, better still, a square comprising a series of equidistant horizontals and verticals.

The figure represents a 13x18 glass squared in centimeters with the dividing machine and reduced by photography. The apparatus being mounted on a horizontally revolving plate duly regulated, the medium horizontal HH′ has been brought into coincidence with the horizon line of the perspective furnished by the objective. If, thence, one causes the apparatus to turn on its platform, the image of all points placed on the horizon plane will invariably be displaced in a continuous manner the length of the horizontal HH′. With the same movement the images of points seen from the vertical center of the station under the angles $O_A PH'$, $O_B PH'$ with the horizontal of the same will trace respectively on this same glass the hyperbolic curves AA′, BB′. The images of points placed symmetrically at first as regards the horizon plane will trace the symmetrical hyperbolic curves A_1 A'_1 B_1 B'_1.

To derive from this property all the benefits it brings, it is superfluous to be acquainted with all the mysteries of the hyperbola It is sufficient to know that it is a double curve symmetrical in relation to two axes and susceptible of presenting aspects more or less analogous to those observed on the figure. The farther the point from which one follows the image from the horizon plane the more pronounced the curving of the line corresponding thereto.

The observation of the simple element of a similar curve such as *mm'* or *nn'*, is quite sufficient for one to know exactly from which side of the horizon plane the point is situated to which it bears relation, and to judge the approximate distance that it is from said plane.

The immediate result therefrom is to determine the horizon line, an easier and less complicated method than any other which the surveyor who has decided to practice photogrammetry can avail himself of. To make it available to all amateur apparatus of common use, but well conditioned, it is only necessary to provide it with a ground glass correctly squared and with a plate with set-screws.

Apparatus constructed as above have been used in the geographical mission on the Slave Coast and at Upper Mekong.

ON THE CHOICE OF SUBJECT.

By Rev. F. C. Lambert, M. A., London, England.

THE choice of subject I suppose is, after all, the most important question that comes before the would-be artistic photographer. Anything, then, which helps us, however slight that help may be, must have some value. It is only in the varied experience of the many that real knowledge may be found. A few reflections based upon the experience of some years may therefore possibly help others; and seeing that it is chiefly through our failures that experience and wisdom come, we may perhaps best compress the matter by recalling some of the more common forms of unsuccess.

First I would place too much subject. As a lecture or sermon may err from containing too many topics, so a picture may have too many points of interest, and—apparent paradox—becomes therefore devoid of interest; or as a crowded shop-window conveys only a general impression of things, and no one thing in particular. If

the reader will cast his memory over the last ten years and call to mind the dozen pictures (not his own) which have made the deepest impression, he will most probably also remember enough of each one of them to establish the rule that the subject-matter of each one was more or less characterized by great simplicity, *e. g.*, old man's head, wreck, sunset on the hills, old tree, etc. In other words, the picture consisted of some one thing, all else being so entirely subordinate that it was merely "a something"—one hardly remembers what it exactly was. Moral is, aim at simplicity; omit as much as you can possibly do without. Too many cooks, etc., etc.; one captain to one ship, etc. In other words, the "law of principality," the "law of simplicity," the "art of omission," call it what you may, is perhaps the first great lesson in picture-making by photography. Nature is so full, so varied, so crowded, so prolific, and our lens utterly impartial, omitting nothing, seeing far more than we see, and condensing into a few inches as many miles of fully occupied space.

Second, I would place the error of depicting the uninteresting, the temptation to attack a subject merely because it presents some points of technical difficulty, or perhaps curiosity or oddity, accounts for many odd things seen. At the same time a thing may be odd, curious, uncommon, or bristling with difficulties, yet it may fail to be pictorial. (As to what constitute the essential elements of the pictorial or picturesque there is no room here to discuss.) Nor should we imagine that the common things of life are devoid of interest simply because they are common. The man of real artistic power shows it most unmistakably by the way in which he treats a commonplace subject and makes a picture. Our own painters, Hogarth, Morland, Constable, Turner, have taught us that the most commonplace subjects may be made into pictures by the employment of real art.

Thirdly, I would point attention to the tendency of one person to try to imitate another man's style of work,—the subject, treatment, printing, even to titles, mounts and frames. The result is certain to be failure. All art work is unique. Anything in the nature of imitation is parody more or less.

There are many other points worthy of mention and attention, but these three are perhaps the ones that are most seen in the greater number of our exhibitions. Let us try to be more simple, more easily contented with a little bit of nature. Let us not be over-anxious to display our technique. Let us be true to our own likes and feelings, and shun anything like imitation of any one's work.

MOUNTAIN RESORTS OF SOUTHERN CALIFORNIA. . . . .

By C. A. Mackechnie, M. D., San Bernardino, Cal.

IN response to your urgent request for "something" for that invaluable addition to a photographer's library, The International Annual, I must tell you about some of the many resorts of Southern California where an amateur photographer can take his camera and return with many hundred artistic pictures, provided they have been correctly exposed. I may state before proceeding further that all exposures must be brief, not necessarily snap-shot, on account of the actinicity. Further, it is advisable to use an orthochromatic screen to secure good results.

One of the best known resorts is

BEAR VALLEY,

twenty-seven miles from Redlands and about thirty-five miles from San Bernardino, on the Southern California Railroad. This is a well-known resort and attracts large numbers of people each year from Los Angeles and surrounding country. The huge reservoir of the Bear Valley Company is in this valley, forming a sheet of water seven miles in length and from one to two miles in width. The lake is well supplied with lake, brook and salmon trout. The camping grounds consist of hundreds of acres of level ground covered with huge pines from 100 to 150 feet in height. Access is obtained by means of a stage line running twice a week to the valley from San Bernardino during the summer. It may also be reached by private conveyance or by burros. The stage ride occupies a day and a half on account of the slow traveling up the mountain grades. Once the summit is reached then the progress is more rapid. The first day's journey takes one by the Highland Company's monster saw-mill, up Long Point to an elevation 6500 feet, then down to Hunsaker Flat and up again over Lightning Dale summit to Green Valley, 7200 feet, where the night is spent. The traveler, during the ascent of the mountain, is amused by reading the numerous sign-posts erected by the late manager of the road.

Knight's Hotel, in Bear Valley, has accommodation for seventy-five guests, and campers will find groceries, provisions, fishing-tackle and ammunition for sale at the hotel. There is good deer hunting within two miles of the hotel and abundance of feathered game.

SQUIRREL INN

was named and constructed after the celebrated inn described by Frank Stockton. It is situated on the Arrowhead toll road, San Bernardino. This neighborhood is an ideal place for campers and photographers. Every year several camps are erected and names given to them by the campers, such as "Camp Indolence," "Camp Energy," "Camp Comfort," etc. In this neighborhood are many charming and picturesque spots worthy of being transferred to the painter's canvas as well as to the photographic film. It is reached by a first-class road from San Bernardino.

STRAWBERRY VALLEY

is located in the heart of the San Jacinto Mountains, 23 miles from San Jacinto, which is reached by a branch line of the Southern California Railroad. Strawberry Valley is a large tract of many hundreds of acres, well wooded with pine and oak. The road to Strawberry Valley is a county road, said to be the finest mountain road in Southern California.

During the ascent the road becomes more winding, presenting beautiful views of Perris and San Jacinto valleys, the surrounding scenery becoming each moment more grand and impressive. The entrance to Strawberry Valley is like the entrance to some famous English park. Immense pines and oaks line the driveway. Strawberry Creek winds down the valley, dividing the two camps which are known as the Idlewild and Keene camps. From here, distant about 1 to 10 miles, the following points of interest are reached and are well worthy of visitation: Hemet Dam, River Cañon, Sunset Peak, Lily Cañon, Cohuilla Valley, San Jacinto Peak, and Tauquitz.

WILSON'S PEAK,

at an altitude of 6000 feet, is one of the best known mountain resorts in Southern California. It is in the main range of the Sierra Madre Mountains and overlooks the San Gabriel valley. It is easily accessible from Santa Anita, a station on the Southern California R. R. 16 miles east of Los Angeles. Stages meet all trains at the station and convey passengers to the foot of the trail, a distance of about 1½ miles. From this point the ascent is made on burros, over a well-built trail, which is kept in good repair and is entirely safe and comfortable.

The trail is pleasantly shaded, and on the summit are numerous

huge pine trees. Trails lead from the camp to Echo Rock, Observatory Peak, etc. From the summit the view of the San Gabriel valley and its numerous cities and towns is magnificent, and on a clear day the Islands of Catalina, 30 miles off the coast, are plainly visible. From the summit also is seen the most beautiful sunrise and a not less beautiful sunset, with which any view from the Righi is not to be compared.

FACTS AND FILMS.

By Alice Lee Snelling-Moqué, Washington, D. C.

PHOTOGRAPHERS, as a rule, "know a good thing when they see it," but few seem at the present time to appreciate the value of films. It was with considerable apprehension and many doubts and fears that I felt the absolute necessity of dispensing with glass and pinning my faith on film this summer in a three months cycling and camera trip abroad. It was only a question whether I was willing to carry a small film camera or none, and all photographers will agree it was not long before I came to the decision that I would try film in the face of such a stern necessity.

My nails are yellow as gold, and our English cousins might believe it a proof of the tales they hear and credit of "the Southern ladies who all dip snuff," but old friend Pyro is responsible, and although stained fingers are not sightly, the two hundred films developed in two sittings are not only a reward, but a delight that will endure when the stains have been removed and forgotten.

When a large number of pictures are to be developed it is then that one is forced to admit the enormous advantage of films over glass.

I cut my roll before beginning work, and then developed three strips of two exposures each at the same time, four ounces of developer flowing them all six nicely.

Having 5x8 trays, the two films ($3\frac{1}{2}$x$3\frac{1}{2}$) were easily accommodated, and having the two together prevented the tendency to curling up. The six views (being mostly instantaneous) came up quite uniformly in most cases, and when one or two were found to require more time to get out the detail in the shadows, I clipped it off

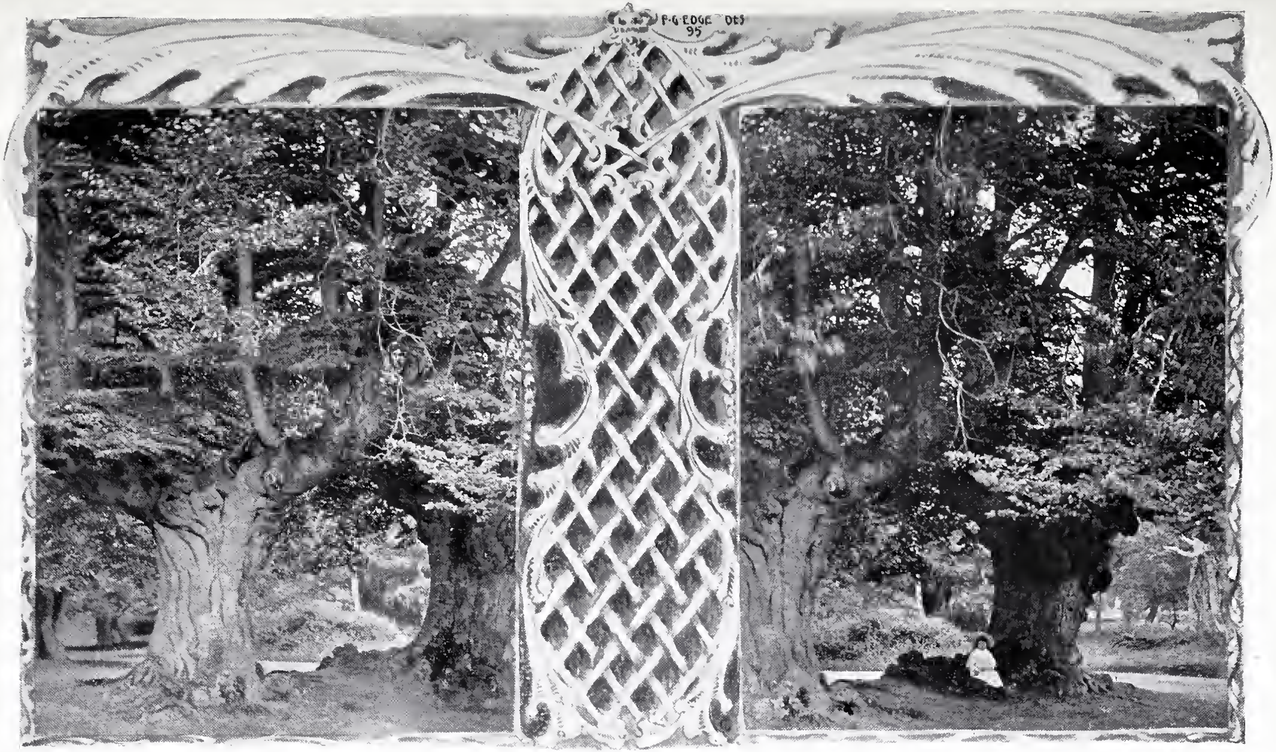


PHOTO BY S. E. KELF.

Illustrating article " Landscapes with and without Figures."

and let it remain awhile longer, putting in the new strips over it and drawing out the bottom one and placing it on top, and then the next, and so on, so all were evenly flowed and the extra one not forgotten.

The hypo-dish that holds at most three plates, of full size, had no trouble in accommodating dozens of these little films, and that without the least danger of ruining the lower ones, as is too often the case with glass, by the corners scratching and marring the image.

Were it not for the misfortune of having had a defective shutter, the two hundred films exposed would take rank as my best work, as none were fogged and only a few lost.

As it is, the views, with the exception of the streak caused by the shutter, are sharp and clear, and the edges show up clean and bright, proving the daylight film is all that is promised, and quite up to the standard of glass in coating and sensitiveness. My negatives are so distinct and strong they are worth enlarging, even after the light-struck part is removed, showing that film, even under adverse circumstances, can be relied upon for rapid and all-round work, under the ever-varying conditions of a continental tour.

Some may say, "How foolish not to have tested the camera and shutter!" I reply, it was tested, and all right at the start, and to those who have cycled abroad it will be unnecessary to state that, after riding all day, carrying our goods and chattels for a three months' trip, developing was out of the question.

Little Italian boys are fond of cameras. I found this out at Pompeii, for mine was picked up and carried off, and the little imp amused himself turning a half-dozen or so of films, for the pleasure of seeing the screw move round, I suppose, and then wanted a "tip" when he smilingly returned it for his courtesy in having taken care of it for me. Not until some distance away did I discover the mischief done, and then it was well for that small Pompeiian that I was some distance away!

Another word to Americans who may contemplate a foreign trip: On no account leave the camera, and also on no account trust to foreign cities for supplies. America is far ahead in manufacturing cameras and all their requisites, and supplies so easily obtainable at home cannot be found in many cities abroad, and in consequence time is lost and much trouble experienced in procuring them, or, sadder still, as in my own case, the camera was carried many miles without being able to get the charming views on every hand, because I had counted on procuring extra films in Florence, and was unable to buy one to fit the camera in that or other cities. In con-

sequence I ran short and lost the opportunity to catch many exquisite and valuable views, and the empty, useless camera weighed several pounds more than when loaded and ready, as it dangled at my back mile after mile in a weary search for film.

Dated film can be relied upon, but the undated article abroad is sold as "quite fresh" when nearly three years old, or such was my experience in Cheltenham, Eng., and it is with great regret I recall the bonny bits in Old England that these "quite fresh" films ruined forever.

The summer is over and the months of traveling on the Continent and in England will soon be only a sweet memory, but no other souvenir could more delightfully recall those past days than do the little views that picture so faithfully our journey from the fertile fields of Holland to the shores of rock-bound Capri.

DEVELOPMENT.

By E. Forestier, Paris, France.

THE ideal developer would certainly be one which, in one solution, would energetically, rapidly and automatically reduce the exposed parts of the plates and sensitive papers, and have in addition the quality of being absolutely unalterable by contact with the air. Of all the reducing solutions actually known, none—though some advertisements pretend to the contrary—can be utilized up to the exhaustion of the liquid, because all, without any exception, become altered by the air during the process of development, and they are worthless long before they have developed the number of negatives that their composition would theoretically allow. Let us take an example from among the reducing substances that the whole world knows, be it hydroquinone or para-amidophenol: 0 gr. 07 centigrams of hydroquinone, from experiments followed with the greatest care, can completely reduce 1 gram of nitrate of silver; of para-amidophenol exactly double the quantity is needed (0 gr. 14 cent.) to reduce the same quantity of nitrate of silver. Under these conditions it is easy to understand that if our developers did not oxidize spontaneously, if they did not alter by causes foreign to our manipulations, a bath of 1000 cubic centimeters, which contains an average generally of 8 grams of hy-

droquinone, would develop thousands upon thousands of negatives before being exhausted,—this term, as used, meaning poorness in reducing substance.

In practice we know it is not so, and that 1000 cubic centimeters of developing bath will not develop but from 100 to 150 negatives, and even then, to attain this result, the work must not be interrupted; that is to say, it is necessary to develop without stopping, so as not to lay the liquid aside to take it up later, for with rest and without use the bath continues to alter and the oxidation begins as soon as it comes in contact with the air, and continues even when the precaution is taken to place it in hermetically sealed jars.

As photographic chemistry does not give us the means of composing an unalterable developer, we must seek to retard this tendency to change as much as possible, to manage so that the process of oxidation be retarded as much as possible, so that we may first develop the greatest number of negatives, and, secondly, preserve the developer the longest time. The experiments attempted while endeavoring to solve these two questions are only those based on trials and gropings in the dark, and it is only empirically that we can reach better conditions of composition, reasonable association of chemical substances, with the object of producing a reducing substance, preserving itself and developing a large number of negatives. Unfortunately chemical products themselves vary too often in their properties and effects to enable us to affirm, under faith of conscientious truth, that such or such combination is the most suitable in the case which interests us, and if one day I feel authorized to give or communicate a formula—automatic, energetic, unalterable—to-morrow I am obliged to renounce such a communication, and this for the reason that I cannot procure chemical products whose qualities and properties are constant, and even, the strangest of all, in obtaining them from the same dealer. I had succeeded in composing an excellent developer, which presented the advantage over other analogous ones in that it was exhausted before it became oxidized; in other words, the reducing substances composing it were entirely utilized in the reduction of the exposed silver salts before being transformed into oxidation products susceptible of tinting the gelatine of the plates. My liquid therefore became tinted but very slightly, and I could develop two hundred and fifty 13x18 negatives during the year without other precaution than keeping the solution in a corked bottle. This solution was suitable also for time exposures as well as for very rapid ones, a point to be considered.

It did not color the nails or skin at all, and did not bring ulcers under the nails, dangerous and painful ulcers, which the professional photographer principally finds it difficult to escape from.

For a long time I believed I had found the dreamt-of formula, but in re-composing "automatic" developers for my personal use, and following to the very letter the manipulations which past experiences had indicated, I ascertained that my bath did not act like the old ones, though the formula was exactly the same. This was due simply to the fact that my old chemicals being used up, I had obtained others. This allows me to state with all knowledge of the cause, and at my expense, that it is difficult, if not impossible. to provide oneself with chemical substances of the same name not varying in their properties and effects, as I have said before. It is therefore due to their instability that I cannot give entire satisfaction to my colleagues in photography.

However, and for the case where one would know the formula which has given me great satisfaction, either for the development of sensitized plates or for the development of sensitized papers, whatever be their brand (with the latter I obtain some superbly enlarged images, the blacks being intense and the whites very pure), I herewith give you my method:

I boil 1000 cubic centimeters of pure water; when boiling I take it from the fire and I dissolve 50 grams of neutral anhydrous sulphite of soda; after dissolving I place in the water 4 grams of very pure caustic lithium and agitate the liquid with a glass rod. As soon as the lithium is dissolved I filter it into a receptacle holding one litre; while the solution is still very hot I weigh 4 grams of para-amidophenol and 3 grams of hydroquinone (white).* Before placing these substances in the hot liquid, 20 drops of a saturated solution of bromide of potassium is added; then, lastly, the hydroquinone and the para-amidophenol are added as rapidly as possible and the receptacle closed with a cork.

It is well shaken to quicken the dissolving of the reducing salts and then left to rest until the next day. If you have used pure products all will be for the best, and you will have a rapid, energetic developer, suitable to all papers and to all negatives. It will not stain the fingers or the gelatine, and will keep indefinitely if it is kept in a corked bottle, and if you have the fortune to obtain chemicals having the indispensable qualities of purity and stability.

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* The para-amidophenol is taken in large spangles that one pulverises in the mortar.

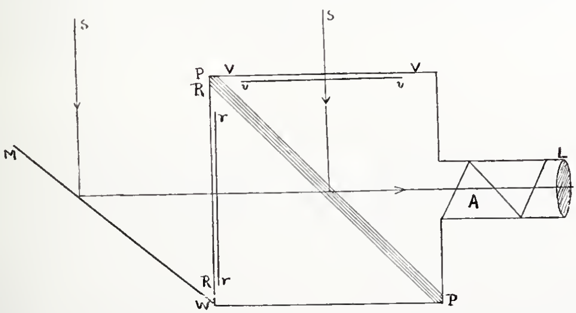
This bath will deposit the inert sub-products which form during the working of the reduction; it is freed from these by decanting when one wishes to utilize it either totally or in part. It is useless to filter it, and the part of the bath used is simply poured back into that which was left in the bottle.

I have said that this developer was equally suitable for gelatino-bromide paper of any make. I will add that if the photographer desires to try it with this class of printing he will find it useless to immerse the proofs in an acid bath before fixing them, and if he finds that the images develop too quickly he has only to add pure water to the bath. A single bath, diluted or not, can serve for a large number of proofs without the least stopping in its action being noticed.

A NEW STEREOCHROMOSCOPE.

By G. H. Niewenglowski, Paris, France.

THIS stereochromoscope permits of a variation of the relative intensities of the three colors and therefore of a nearer approach to truth. It is reversible, that is, it serves at the same time for the production of the negatives themselves while being also applicable for the production of an image of the object in colors. It is composed of a cubical camera



carrying plate-holders for negatives or positives at will on the two sides VV and RR. The front vertical side is provided with openings to which are attached two tubes, each carrying a Nicol, A, serving as analyzer, and a lens, L, with very short bellows, and centers of the two openings being at a distance of 65 millimeters (the distance between the two eyes).

In PP (see the illustration) are a number of sheets of glass with perfectly parallel surfaces, a bundle of plates as called by physicists, and acting as a polarizer. If we suppose the negatives taken with this apparatus and the positives taken and seen in the places of the negatives, in special frames, one can use the instrument as a stereochromoscope as follows: The light coming, we will presume, from the sky, reaches the positive VV, through which it passes, traversing the colored plate *vv*, and being reflected by the sheets PP, after penetrating the analyzer A and the lens L, reaches the eye of the observer, causing him to see a red image, we will say. The light from the sky also falls on a mirror MW, which reflects it through the positive RR, and through the colored glass *rr*, the sheets PP, the analyzer A and the lens L. The eye placed in front of the lens L sees a red image and a green image that combine to give one sensation. The other eye placed in front of a second lens also sees the blue image placed vertically or horizontally at will, and, if necessary, a fourth image. The three or four images merge and the observer sees the image in relief and in colors. On turning the analyzer A, the colors can be mixed in varying proportions, and thus the colors of the object can be brought to as close an approximation of the original as is possible.

INDIRECT PHOTOGRAPHY IN COLORS, OR PHOTOCHROMOGRAPHY. . . . . .

By G. H. Niewenglowski, Paris, France.

WHEN Cros and Ducos du Hauron invented, each separately, the indirect process of photography in colors, it was thought that there existed only three colors physically distinct (Brewster's theory), whose superposition in variable proportion was capable of furnishing all the colors of the spectrum; but our eyes felt three different sensations, corresponding to three kinds of nervous fibres. In accordance with this theory, due to Helmholtz and Young, the sensation of color is due to the action of these three impressions which are produced by three fundamental colors, red, green, and violet.

Though still adopted by many savants, this theory of Helmholtz and Young is not generally accepted; the histological study of the retina and the various parts of the organ of vision has never proved

any decided existence of the three kinds of fibres. Moreover, a recent theory due to M. G. Darrens, of Paris, a theory bearing on the viewing of the colors of the celebrated experiments of direct photography of colors of our illustrious master, Professor Lippmann, rejects entirely the existence of three species of nervous fibres.

The reality is, as shown by Maxwell, a simple or complex color can be represented by a linear function of three colors principally, that of three colors chosen such that their mixture, in suitable proportions, can give white light. It is known that the union of these three colors can, taking them with a suitable coefficient, produce on the eye the same impression as that of the colors they represent. But the spectroscope duly shows that one color, and the color producing the same sensation, obtained in mixing the three principal colors, have not the same composition.

If, with Dr. Broca, we define the intensity of a color by the energy expressed in ergs and by the number of square centimeters of surface that it illuminates, we could easily know by means of tables the value of the mixture of the colors, not only in tint, but also in intensity.

This complexity of the theory of color explains why the indirect process gives only with difficulty absolutely true results, and therefore, though discovered in 1865, it is not much followed at present.

It is easy to see that to obtain a result which comes as nearly as possible to the truth it is necessary to lighten respectively the three primary positives with the three same radiations employed in obtaining the three analytical negatives.

THE REALM OF PURE ART.

By Charles Richards Dodge, Washington, D. C.

NOT so many years ago an artist said to me, while conversing about photography, "It can have no place in the realm of pure art because it is too cold and literal." He had long used the camera, though only as an accessory, making indifferent negatives, the prints from which were regarded as mere "notes," for he only made pictures with the brush or pencil.

At that time the writer had not joined the ranks of the camerites, and, as he was living in an art atmosphere, he regarded his friend's say-so as official and final. And when in time he became interested in amateur photography, doubtless the influence of this idea, that there could be no art in photography, was largely responsible for the satisfaction experienced in taking mere views. Any one with average intelligence can take views, and some of the veriest tyros have brought home many souvenirs of their outings that were both satisfactory to themselves and pleasing to their friends.

Not quite four years ago I took up photography, and for the first two years was quite content to make views, something as a gunner shoots sand-peeps—hit or miss; there was a deal of satisfaction in the experience, too, but one day my eyes were suddenly opened to the "possibilities," and since then I have been struggling to do a little in the realm of pure art with a camera.

Perhaps, thus far, I have met with such ill-success—despite a few exhibition honors—that it would be wiser and more modest to practice longer before preaching. However, I have seen enough in the work of others, as well as in the imperfect results of some of my own attempts, to convince me that amateur photographers, as a rule, are too conventional, too limited, and too much tied down to the traditions of the professional studio and dark-room. The impressionists, among painters, are often ridiculed as a set of cranks, but we know there are men of genius in this school who have produced wonderful canvases, and we know too that these strong workers, through the very audacity of their efforts, have influenced, in a marked degree, all the other schools of art in the direction of broader treatment and more subtle effects in their creations. In the field of literature, the strength of such writers as Daudet and de Maupassant is due largely to the delicacy and subtlety with which their subjects are treated.

Now this is the precise point of departure for the camerite who desires to leave mere view-taking to the fad-photographer and plunge into the realm of pure art. I say plunge because it must be a complete breaking away from conventional ideas, and a disregard of all that Tommy-rot about reliance upon "chemical work," mainly, for success. When a man has nothing else to bank upon but his knowledge of chemical work, he is surest of taking medals where old-fogy professionals and the agents of plate-manufacturers are the judges. Female village bridegrooms and shepherds, in theatrical tights, will always "catch" such a jury

if the chemical work and the retouching have been skillfully attended to, but the true artist is never caught with such chaff.

Do not for one instant think I am deprecating a thorough knowledge of chemical work, both in theory and practice. I would simply take the knowledge for granted, consider it as an essential element, and say no more about it.

On the other hand I would strongly advocate experimentation to the end of producing purely artistic results by any honest means at hand, even if we may take advantage of—please pardon such heretical views—erratic timing, defective focus, and clever makeshifts in printing. But I do most emphatically condemn the printing in of skies, taken under one set of conditions, over landscapes secured under conditions often the complete reverse, with an entire sacrifice of values, and hence of perspective, upon which so much depends. Only an artist should attempt double printing.

At the same time I would as emphatically condemn the attempt to make pictures by means of defective focus and wrong exposure, without a full appreciation of the effect that was to be produced by such means.

One of my pictures, that has been greatly admired by artists but not by the average exhibition judge, has more than once been taken for an etching. Its perfect simplicity is due to most careful composition—the subject being three cows in a pond—and the etching effect to a bit of trick in making the exposure, by means of which a most artistic "fuzziness" and softness has been produced. And this effect was afterwards heightened by slightly enlarging a direct print made upon rough platino paper. Doubtless the chemical-work crank would turn up his nose at it, but as the picture was the result of an attempt to break away from the conventional and the literal in photography, and, in intent, to be viewed from the purely artistic standpoint, I am satisfied with the judgment, regarding its merits, of those who are not photographers at all, but who follow the paths of pure art for art's sake.

Now I would rejoice to see the establishment of a school of "impressionist" photography. How strangely the words appear when written! But in creating such a school it should be distinctly understood at the outset that it must occupy a place purely its own—neutral ground, let us say, between the recognized field of photographic art and the art of the painter and etcher. Naturally the field would be restricted, and those who might hope to attain success in entering it would be the men and women who are artists in feeling and who

possess in a marked degree the artistic temperament. On one side, then, we would have the literal photographer, the snap-shot fiend, if you will; on the other the photographer who strives to produce artistic effects by any means, with all shades and degrees filling the middle ground.

There are good people who have a deal to say against "mysticism" in pictures, but whose criticisms lack force because they do not perceive the point of view. I know that strong contrast, that is, simple black and white effects, is condemned by the average exhibition judge, and I fully appreciate the fact that the term "Rembrandt" may be wrongfully applied to a piece of bad lighting. But, after all has been said, what if some of the tenets of the "all holy" should be disregarded and conventionality violated, if the end is an artistic picture? What if "luminous shadow" turns out to be only "impenetrable mystery" if the result is something that grasps the beholder, so to speak, and thrills him in spite of himself? Pardon me, Mr. Slave-to-technique, you are not playing in our yard and will please be silent. Shall we leave the making of all the startling, magnificent things in art to the painters, and be satisfied with producing technically beautiful photographs that are "nothing but photographs" after all, or shall we recognize that there is such a thing as genius in photography, and attempt creations—strong pictures showing thought and a nice combination of the gray matter of the brain with the skillful manipulation of a lens? I take it the field is an open one and that all who will may enter. And in this connection chemical work must be taken for granted—the palette, merely, which the "artist" learned to lay out when he was perfecting himself in the rudiments.

The illustration which accompanies this article represents a technically bad negative, and one likewise that has been severely criticised—from the standpoint of a studio portrait, however—but the unprejudiced reader must admit, I think, that an ideal effect has been produced, although the picture was made from a commonplace subject, the face of a professional life-model, but who, happily, knew how to pose and who was as plastic as clay in the hands of a sculptor.

As a closing remark let me add that I may have offered a dangerous suggestion to many amateur photographers—those who have all the knowledge and skill to make technically perfect things, but who may not understand the principles of artistic composition, and who are unable to see, with an artist's eye, the possibilities of a subject

from the higher standpoint, or the effects they would produce. The first results in any case will be vexation and a lot of spoiled plates, but I am sure that one grand success, if the realm of pure art be attained, will be worth the cost of a hundred failures.

SIZE, SHAPE AND SHADE: STAND OR HAND CAMERAS. . . . .

By William J. Spurrier, Moseley, England.

THE editor has again extended his invitation for a contribution from me, but I am sorry to say that other matters have required my attention and my larger camera has not made the progress I desired. I am still satisfied with quarter-plates; for, as I wrote last year, "size does not trouble me," i. e., largeness of size in the negative. Apart from the power of enlargement, have we not had, in the last year's exhibitions, proof that merit is found to exist in prints of much less size than "quarter-plate," whereas size—considerable dimensions—used to be of paramount importance to obtain recognition? In other ways this matter of size has latterly been receiving the attention it should, but it is not yet fully realized, especially by the large army of recruits.

Many there are who are not prepared to admit that there is any size in hand-cameras, nor that any real and good work can be done with such an instrument. But as I wrote last year, the most modern and up-to-date cameras, hand or stand, have such a strong family likeness "that it becomes difficult to distinguish between the instruments at all." In evidence of this, one has only to turn to "Photography Annual," 1895, to see the difficulty Mr. Chas. R. Rowe, M.J.I., has had in the classification of cameras and hand-cameras. In fact an exactly similar camera, in 1894 is classed amongst hand-cameras and in 1895 it figures as a camera. Further, the notices are illustrated by the same blocks, the only alteration being that a portion of one of the electros has been cut off and the manufacturer has given the instrument another name and price. I only mention this in proof of my contention.

As with stand and hand-cameras, size and shape are most intimately connected, are absolutely inseparable when considering the mounting of your picture. Further, the shade or tone of the print

is of no more importance than the shade of the mount in or upon which it is to be placed. For, as so explicitly set forth by the Rev. F. C. Lambert in a recent article, you can actually change the tone of your print by putting the right mount and frame to it. Often our illustrated publications, periodical and otherwise, are great culprits in size and shape, i. e., trimming down. To illustrate my meaning I will mention two instances I have particularly noticed; in both cases the prints are collotype ones, viz., "Kelp Gathering" and an art (?) series of large size. The former is a beautiful little picture by W. M. Warneuke, $4\frac{5}{8}$x$3\frac{1}{2}$ inches, on white plate-marked paper, with the horizon of an ambitious turn. Immediately upon arriving home with my treasure I took up the first piece of paper with a shade or tint that came to hand; cut a hole in it $4\frac{1}{4}$x$3\frac{1}{8}$ inches, placing it on the print so that it covered $\frac{3}{8}$ inch of foreground, set the horizon true and cut off $\frac{1}{4}$ inch of same, and $\frac{1}{8}$ inch of the rocky side. The result was a most marked improvement, the effect being almost stereoscopic. Of the large ones (it is to the term art as applied to this series to which I object), some could be trimmed down and put on suitable tinted mounts with great advantage, but the others are quite past hope, utterly unredeemable. The only use to which they could at all profitably be put would be the back flats of a toy theatre.

If photographers of experience, as they were in the two cases I have cited, can be guilty to such an extent, I trust I shall be forgiven for again directing the attention of your readers to the matter.

When I want to enlarge my "quarter-plates" I do so by the aid of "cresco fylma" to negatives to at least 5x4 inches, then take a contact print on a transparency plate and enlarge that, floating it on to plain glass for a transparency, or on to an opal plate, or lastly, on to a stout card. In the latter case I attach a piece of thin paper so that the card will dry flat.

CHOICE BITS IN NEW HAVEN.

By M. T. O'Connell, New Haven, Conn.

NEW HAVEN is, as almost everybody East knows, situated on the Sound. In the laying out of its streets, its public buildings, its electric and water supply, it is just the same as every other American city, but it has a few special characteristics over its sister cities in the wealth and beauties

of its surroundings and the magnificence of its elms and richness of foliage. For this reason it is called the beautiful Elm City. Right at the entrance of the Old Green (an open park planted with elms in the centre of the city) stands its oldest elm, on which a sign calls attention to its age and date of planting. It is a regular forest king, and typical to-day of the sturdiness, valor and energy of the New England stock, descendants of the illustrious Mayflower Pilgrims. To the tourist or photographer, it is hard to guide you to any particular spot or place in particular, for all are deserving of special mention, and one lovelier than another.

Right in the green stand three churches, one specially historic—Centre Church; the first erected on the formation of the colony, then called Quinnipiac.

Right behind lie the graves of the Regicides, and backing these, facing College Street, peeping through the wealth of foliage, the college of Yale, now famous over two hemispheres—good old Yale! Every spot hereabout is worthy of a plate, and from an artistic standpoint the resulting picture ought to be perfect.

Right near the old elm and pump on the green, facing them across the street, is the Insurance Building on Chapel Street, from the top of which our local weather observer takes accurate forecasts every 24 hours. A visit to the top will be of interest. Permission can be obtained from the firm of F. M. Brown & Co. (who run the largest dry goods store in the State) to ascend on the firm's private elevator to the roof. The building is six or seven stories high, and on top a magnificent panorama presents itself to your delighted gaze. On a clear day you can see fully six or eight miles around in any direction. You have in fact New Haven in a nutshell, and if you have not time or inclination to go around, you can get a very good idea of the city from this point of vantage.

The city is at your feet, and all the outlying districts, West Haven, Fair Haven, North Haven, Hamden, Westville, Orange, in the circle which bounds your horizon.

Southward stretches West Haven, Savin Rock, and the harbor; then the busy depot of the N. Y., N. H. & H. Railway, for ever smoky with the puffing of the engines, and for ever alive and active with the ceaseless toll and clanging of bells. The bay is crowded with craft of all kinds, from the small sailboat to the large steamer and three-master. Over the bay at Five Mile Point is beautiful Morris Cove and the old lighthouse; nearer, a host of flat roofs, church spires, factory chimneys and public buildings.

More east, Fair Haven Heights, where the green of the foliage mingles into the grey of the summer sky.

Northwards the Quinnipiac River, as it winds silently through quiet, low, salt meadows from the country to meet the busy town and flow past to meet the ocean.

Further north, rising upward in the blue mists from a foreground and middle distance of trees and house-tops, rises East Rock, its sides lit up to a yellowish-reddish purple by the afternoon sun. On top, pointing to heaven, the slender dome of the soldiers' monument, sacred to the memory of those brave fellows who fell in defense of the Union.

Westward, beyond the cool green shades of Hamden lies West Rock, famous for its Judges' Cave. The city lies between those two great mounds. Further westward still, Woodmount, and just where the sun sinks in a ball of golden fire, the old road to Orange over the West Meadows and river and by Birrells Hill.

This bird's-eye view will satisfy you of the claim that New Haven is beautiful, and that with her situation and shore attractions she has a brilliant future of prosperity before her.

Easy access to all surrounding points of interest can be had by a well-conducted trolley system, all of which start from the green. For the moderate sum of 10 cents you can get anywhere within 5 miles.

Savin Rock on the west shore will well repay a visit; while a tourist or photographer would be delighted with Morris' Cave and Lighthouse Point on the east shore. Some beautiful lakes are in the vicinity, notably Lake Saltonstall and Lake Whitney.

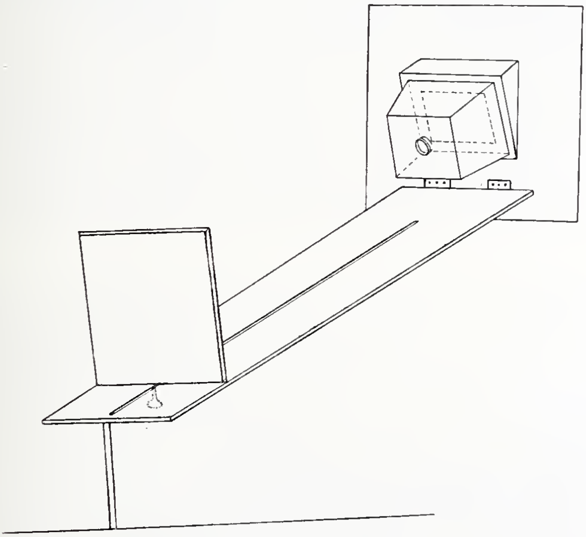
To any one with time and leisure and a good camera, the City of Elms will be a good place to visit. Hotel accommodation is excellent and visitors receive every attention.

ENLARGING FOR AMATEURS.

By J. R. Greatorex, Shrewsbury, Eng.

THE editor's "whip" again reminds me that the time has arrived for the usual contribution to the "Annual," and the question arises, What shall it be? Something useful and practical! So I think I cannot do better than send a few lines on a method of enlarging which I have found very useful in my own practice. To do so I shall have to give a rude sketch

or two of the apparatus employed, and as these are very plain and simple, the construction of them will not be beyond the ability of any average individual who can handle a few tools. In the first place I utilize a small room, or if there is a suitable window in the dark-room it will be just the thing. Make a board to fit the window (No. 1), and in it cut an opening (No. 2) as per sketch about 10x8, then case the opening round as shown (this is to get a direct light to the sky), leaving an opening $8\frac{1}{2}$x$6\frac{1}{2}$, this will hold whole plates, or with carriers $\frac{1}{2}$ or $\frac{1}{4}$ plates; on either side of the front fix two pieces of wood with a $\frac{3}{8}$ groove (No. 3) on the inside; this case is to carry a sliding-box arrangement, something like the old box-camera; then hinge a board, say 6 ft. long by 15 in. wide and



1 in. thick, on the shutter about 9 inches below the edge of the opening, the hinges should be loose ones or sliding so as to take the board away when not in use; make a slot in this board for say 3ft. 6 in. down the centre, this is for clamping the frame which is to hold another board on which the bromide paper is fixed with drawing pins. Make a frame 16 in. square with a $\frac{5}{16}$ groove down each side to hold a piece of clear, well-seasoned pine board $\frac{5}{16}$ thick; at the bottom of the frame fix a thumb-screw, which should be long enough to pass through the slot in the base-board so as to screw the frame fast to it at any distance; a piece of inch thick wood for a strut to prop the base-board up from the floor completes the apparatus.

To enlarge, pin a sheet of white cartridge or Whatman paper on the erect board, and draw or slide the box containing the lens in or out until a perfectly sharp image is seen on the paper (for distances see table of enlargements in almanac); then cap the lens with a cap which has a piece of yellow glass in it, this will enable you to see how to fix the bromide paper square to the board; expose a suitable time, which may be determined by trying a strip of the paper first, and then develop.

DEVELOPMENT.

After trying all the various developers suitable for bromide paper, I have found one admirably suited for it,—amidol; nothing could be better or simpler. To prepare the developer take

40 grs. Amidol,
10 grs. Br. Potassium,
480 grs. Sulphite Soda,
10 oz. Water, distilled,
Mix.

Give a full exposure, and with the above developer you will get a picture, soft, full of detail, and a good color; quite a different thing to the hard, black results one often got with the old "iron" developer. One great advantage with amidol is that the shadows never get blocked up, but leave beautiful detail even in the darkest parts of the picture; another advantage is that it does away with the acid bath, which was always a nuisance and caused complications and a lot of extra washing.

Stop the development before the image has quite gained the full density required, by rinsing in two or three changes of water, and fix as usual. I may say that two or three prints may be developed with the same developer before throwing away. To those who are fond of bromide paper I trust they will give the above a trial, as I am sure they will be more than satisfied.

PHOTO BY NEWMAN, NEW YORK.

ENGRAVED BY ART PHOTO ETCHING CO., NEW YORK.

CHARACTER SKETCHES.

LANDSCAPES WITH AND WITHOUT FIGURES.

BY S. E. KELF, READING, ENG.

MANY photographers hold fast to the opinion that figures should not be introduced in any way in landscape, as they detract from the central object of the photograph. Others believe, amongst them myself, that the placing of a figure, provided, of course, it be a suitable one, helps to give a truer idea of the thing taken than without such. Chance figures or moving objects very often lend themselves to make a picture,

Photo. by S. E. Kelf.

and if they do not, a little persuasion or kind word will do wonders in getting something next door to it. But sometimes the placing of incongruous figures, or not waiting till they have taken their departure (which amounts almost to the same thing), spoils the effect. I have in my mind a splendid photograph of a church, completely marred by a number of children standing in the foreground in such a manner and position as to completely rivet the attention to them, and not the principal object, the building itself. Unless

figures blend or harmonize with the scene portrayed, better leave them out, or let them be so small that they are quite subordinate. Two photographs of Wallingford Bridge crossing the upper Thames, and two also of Burnham Beeches, with and without

Photo. by S. E. Kelf.

animate objects, introduced or "caught," as it were, just at the moment of photographing, accompanying this communication, may serve in some measure to illustrate what I wish to be understood.

WHAT IS IT THAT WE WANT TO SEE IN A PHOTOGRAPH? . . . .

By Dr. Hugo Schroeder, London.

THIS question, at a first sight, seems to be as useless as the fifth-wheel on a carriage. Well, as we have recognized that the fifth-wheel on a carriage is not so useless as the proverb says,* this question is neither useless nor as simple as it appears at first sight. Indeed this question keeps only

* In Hamburg are such cars with five wheels; they had to fulfil the condition to run in and out the rails; this was performed by introducing that fifth wheel as a guide pulley.

its simplicity if we limit ourselves to producing a true copy from a printing (supposed to be black and white), either of the same size as the original or diminished or enlarged. If we employ a most perfect lens with small aperture and sufficient field, we will always arrive at a satisfying result if we observe only the rules prepared for this purpose. But in only introducing colored printing on the original, we meet with some difficulties, as the light of different colors does not act actinically alike, and we are obliged to use orthochromatic plates. But suppose somebody would have the idea to produce a copy from a number of perforated plates as objects simultaneously, all separated by intervals, one behind the other, but each object to appear as sharp and well defined as the other, and all objects to be seen on the photo in their proper size, just as they appear to the eye of the onlooker. These conditions seem to be very reasonable, but I am going to show that in all its precision this is unfortunately impossible for any lens in existence. First of all, those objects nearer to the lens will be magnified at a higher ratio than those which are further away, and only one of all these objects can be brought to a sharp and perfectly defined image when focused, so that one object after the other can be well focused, but not all simultaneously.

Now we have no remedy for these defects, but we can diminish them. To diminish the defect of the imperfect focusing we must judge, according to all the objects in question, on which object we shall throw the sharp focusing (and this is one of the arts of the photographer), so that the defects produced by all the other poorly focused objects are at a minimum. Next to this we can improve the imperfectly focused objects very much in diminishing the aperture of our lens, as we easily observe that foggy appearance of the image is diminished in diminishing the aperture of the lens by a screen called a diaphragm, as in this case the pencils of rays forming the image get more acutely pointed out. This is a very simple method and known to everybody connected with photography. The only drawback in this way is that at the same time the intensity of the light is very much diminished, but as we have now such highly sensitive plates at our disposal we can use very small apertures for one lens with advantage. We really can say that by introducing these highly sensitive plates we have deepened the focus of lenses to a very great extent; as the technical term for the property of a lens to show near and distant object simultaneously well is called the depth of the focus. Regarding the first defect, however,

the unequal magnifying power of the lens for near and distant objects, this appears at the first sight a hopeless problem. This defect we can also diminish. We might put the question, How has Nature overcome this difficulty, as our own eyes are nothing else than an optical apparatus like a camera, but only on a very small scale, but just in this very circumstance the secret is to be found.

The supposition given before, of a number of perforated plates as objects for copying, is nothing else than a representative of the

Fig. I.

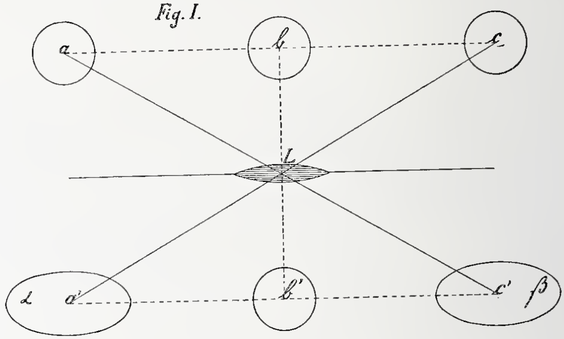
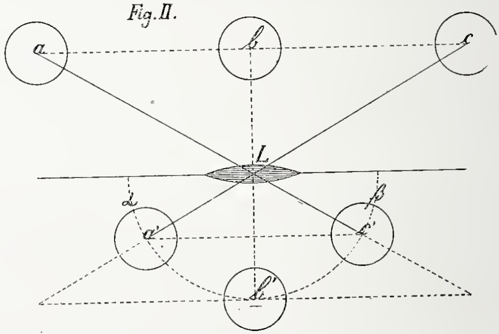


Fig. II.



most of the ordinary objects to be photographed. The only difference in these two kinds of objects is that all ordinary objects are continuous, i. e., they are not represented by a few plano plates (perforated), but may be compared to an endless number of such plates; and so are the images produced by the lens of these infinite number of objects which are represented by an infinite number of images from which one image can only be projected on the screen or plate, and all the others are situated either in front or at the

back of the screen, that is to say when the object is in the solid the image is also in the solid, and when the object is represented by a plane surface the image is the same. To facilitate all photographic operations we want our image on a flat plate, and so the optician is obliged to struggle for the production of an image as flat as possible, when a plano-plate as object has been used. At first sight this seems to be the most correct way, and many people think that the production of such a flat image is the acme of optical perfection and will therefore produce an image as true as possible; but this unfortunately is limited again to one plane or flat object; when the object is solid we have to struggle with another defect in this case. It is well known to photographers that if they take a photo from a number of spheres, these spheres will be only in the centre of the field represented truly by a circle, but on the margin of the field the sphere will be represented by an oval very nearly the shape of an ellipse. This defect grows very much with the angle of the field of the lens and also with the size. In what way this defect is produced is seen in Fig. I, which represents the ground-plan of the object as well as the lens L and the screen. a, b, c, are three spheres, and a', b', c', are the images of those spheres on the screen which is represented by the line α β, and this is the simple case of unit of magnification. Now we might again inquire how has Nature treated this problem of getting rid of this defect, because it would be very funny if we see, say a gentleman's face when being opposite to us having the true shape of his face, and on removing to the side so that the image of his face now meets with the marginal parts of our retina in our eye, his face should be then egg-shaped. The solution of this problem is performed in such a way that the shape of the screen (retina in our eye) is not a flat surface, but a part of a hollow sphere, and its radius very near the equivalent focus of that of our eyes ($=$0.585 inch). In Fig. II. it can be seen at a glance how this arrangement does avoid this defect, and a sphere also, as any other solid object, is represented in its true shape on the screen. If we now fall back to our question, "What is it that we want to see in a photograph?" we can answer by saying that we want to see the object to be photographed on a flat surface as nearly as possible in the same way as the image is formed on the retina in our eyes and recognized by our brain. We have seen from that stated before that with the lenses at present in use and with a flat surface on our screen in our camera it is impossible to see it the

same way, but we can, by suitable arrangements, approach this perfection more and more.

Now I come to another statement which generally is very much misunderstood. It is generally believed that the difference of an excellent picture drawn by a first-rate artist (as it differs more or less from the photo of the same object) is less true than a photo, and the photo is looked upon as mathematically correct. It is very often the reverse when we state that we want to see a photo as a true picture as produced by our eyes. The artist who is only guided by judgment acquired by training his talent, by great practice and long experience in struggling to produce his picture (on a flat surface) in such a way as to represent the appearance of the object just as our eye gives it. Therefore it is the most time wrong to criticise an artist's picture by a photograph. If landscapes are taken at a great distance with a lens of medium size field, a good artist's picture then will agree very closely with the photo taken in that way. The very opposite will be the case if the interior of a small room be taken with very wide angle lens, or a photograph of a person is taken at a short distance with a lens of a very long focus and in an unfavorable position. In both of these cases no artist would put such a caricature as the photo is on his canvas. Of course there is another side to that question about photos of persons in a studio which cannot be treated either by the mathematical rules or by the laws of geometrical optics, and only relates to our question, whether the person to be photographed wants a photo which shall meet the image produced by the brain alone and not with the assistance of the eyes of such person; then the unfortunate photographer is limited to negative retouching in a more or less extensive kind.

There is another very important point in relation to portraits, as it is well known how important it is in what way light and shadow is distributed in the studio and cast upon the person to be photographed. It is not very difficult, by casting light obliquely on a face, to make it appear much older than the person really is, and otherwise the light can be used when more equally distributed through the whole studio and directed in such a way that the face of the person will look very fine indeed. Of all the studios I know there is no better studio than that recently invented by Mr. Eggenweiler. His studio has no skylight; instead of that it has one large vertical window (about 400 square feet of glass) directed to the sky, as near as circumstances will allow to the north. In this case no beam of sunlight can enter direct into the studio. As

is well known, direct sunlight, even when filtered through screens or curtains, never produces such fine and soft effects as the equally distributed light from the north sky. Even this light is not used, for the most part, direct in the Eggenweiler studio. The light which enters the large window meets everywhere in the studio with walls covered with plaster of Paris, which break up the light and distribute it again. For this purpose there is the roof of the studio (inclined 45°) inside also covered with plaster of Paris, which reflects this light vertically downwards. This light is softened again by a horizontal light-breaker made out of a fine white gauze veil through which the light is filtered. The large window is on its underpart, from the veil to the floor, covered with screens of dark cloth, which are movable in such a way that the photographer can cast direct light from the north in every direction on the object to be photographed. The only drawback to this studio is that it cannot be erected in large towns on the ground floor, as there is no light from the north sky to be had. Besides these advantages of this new studio there is another in relation to the leakage in case of heavy rain, and the snow deposited on the glass roof of the ordinary studio, from which this studio is not affected at all, as the roof is just like the ordinary roof of a house. It may be mentioned that the appearance of this studio from the outside is not very artistic but more or less ugly. The best light which can be procured of course is the daylight, but as we have not always daylight at our disposal, we are obliged to use artificial light, especially here in London at the winter season. It is well known that very many contrivances have been tried and are in use; every light procurable has been taken into contribution.

One of the most effective lights is the electric light, as it contains all colored rays, and specially a larger quantity of actinic rays in ratio to its power than even our sunlight. A drawback to the electric light is only that the arc-light is not steady and the incandescent light (which, of course, is very steady) wants an abundance of electric current when strong enough. Our semi incandescent lamp, which combines the advantages of both lights, which we especially constructed for this and similar purposes, such as for projecting apparatus and medical purposes, is therefore more preferable.

IN SHAKESPEARE'S COUNTRY.

By Signor Aspa, Leamington, England.

"Piping Pebworth, Dancing Marston,
Haunted Hillborough, Hungry Grafton,
Dodging Exhall, Papist Wixford,
Beggarly Broome, and Drunken Bidford."

DRUNKEN BIDFORD!" Ay, and the Bidfordians are proud of the distinction. The tradesmen there perpetuate the legend in their circulars. One from a grocer lies now before me, in which the celebrated lines are set forth at full length, accompanied by an announcement that So and So's "wines and spirits are kept, and may be had by the bottle or in larger quantities." Thus, with an unusual supply also of good inns, every inducement is held out to the natives and their visitors to keep up the place's ancient reputation, and it is to be hoped that strangers from over the sea, who, by the bye, are not said to be indifferent, as a rule, to liquid refreshment, will not quit this renowned drinking-place without trying the quality of "its brew."

But Bidford, besides the old Falcon, the church, and the bridge, which is thought to date from the 15th century, and which every one is certain to photograph, possesses many a purely picturesque scene that has been the delight of our brethren of the brush, and that it will be my pleasant task to point out. First, however, it may be well to say how one may get there.

The most agreeable way, doubtless, is to go to Stratford-on-Avon by rail, and from thence by road, driving, or driven, carriages being easily to be had at Stratford; or one may make the whole journey by rail, via Bearly, Alcester (once a Roman town), and Broome; a round-about way, with several changes, and for which the time-tables of the day will have to be studied.

But I have remarked that many intelligent travellers have a wholesome habit of rising early, doing a large part of their day's work before the mid-day meal, taking an hour's siesta after that function, and then, refreshed by food and rest, starting again for another good turn before sunset. Photographers will find this an excellent rule. They escape some of the noonday heat, and to a certain extent they avoid the commonplace effect that marks most things painted or photographed under a vertical sun.

Supposing, then, one of our craft to have breakfasted in Leamington in time to take the 7.40 A. M. train to Stratford-on-Avon, I will plan him a profitable day's work, and, assuming that he seeks out for himself the larger and more striking objects, will illustrate this paper with a few such "bits" as the artistically-minded value most, pointing out also where they are to be found.

Our traveller by the above train will reach Stratford at 8.23. A hundred yards or so from the station he will find the "Memorial Fountain," given so generously to the town by Mr. Childs of Philadelphia, and at this he will take a shot. In the next street to the left stands Shakespeare's birthplace, upon the exterior of which he will

Negative by R. Aspa.

ON WEST SIDE OF BINTON BRIDGES.

also direct his camera—perhaps more than once—after which he will probably spend a quarter of an hour inside. In any case he should be on his way to the church by 9, getting shots in passing at some of the old houses and other objects of interest on either hand. Reaching the church, if he finds it open, let him go in at once. If shut, he may send for the custodian to meet him in half an hour, and spend that time in the fields on the far side of the river, from whence the best views are to be had. These fields are reached by a wooden bridge, only a good stone's-throw below the church. There should be ample time for these matters and to catch the 10.25 train at the "East and West" Railway station, which is quite near the church.

Before going farther it may be well to mention the great advantage I have found in securing a boy as guide on these excursions. For a shilling or so he carries the things, saves one in time and in distance, and, above all, serves as lay figure in one's pictures.

By the 10.25 my friend will find himself at "Binton and Welford," where I strongly advise him to alight. For here are two quaint bridges—"Binton bridges"—by the sides of which the accompanying "bits," and scores more of such, may be had. And here is an inn, "The Four Alls," where something may be ordered to be ready, say by 12.30. The sign goes thus:

Negative by R. Aspa.

ON EAST SIDE OF BINTON BRIDGES.

"I rule all,
I fight for all,
I pray for all,
I pay for all,"

with painted effigies of king, soldier, parson, and farmer, respectively, at the end of each line. From this a 5-minute walk by road or field leads to Welford-on-Avon, which, for the Midlands has of late years become nearly as great a resort for artists as Newlyn is now in the West. And were Shakespeare alive he would doubtless find an appropriate epithet for the place, "Brushmen's Welford," perhaps; for nearly 40 people have been known to be painting in this little place at one time.

Here, spread over a considerable tract of ground—in one direction, to Weston, about a mile—is a perfect wealth of pretty cottages; some lining the roads, other partly hidden in the orchards, scarcely one of which has not been painted or photographed again and again.

To carry out my suggestions to the full, time must not be wasted in wanderings far afield. It will be best to make at first for the

Negative by R. Aspa.

COTTAGES NEAR CHURCH AT WELFORD-ON-AVON.

Negative by R. Aspa.

LICH-GATE, WELFORD-ON-AVON CHURCH.

church, where within 20 yards 20 plates may be exposed. Here is a genuine old lich-gate, most picturesque cottages, some thatched,

others tiled, many of which will pay to take from different points, and about which figures in harmony with the surroundings are sure to be seen. Having done here, we go to the mill—close by—which, though not very picturesque in itself, is most beautifully placed; just above it there is a little fall that lends an extra charm to the scene. If, after this ground has been properly worked, there is time to spare, the upper end of the village may be visited. Many more good cottage subjects will be seen, as well as a 10-feet stump, all that remains of an immensely tall and well-decorated maypole that graced the village for many years, but was blown down in a storm quite recently.

Negative by R. Aspa.

MILL AT WELFORD-ON-AVON.

It must not be forgotten, however, that "something," "eggs and ham," perhaps, was ordered for 12.20 at the "Four Alls," and that punctuality should be observed if due time is to be given to the meal and the nap that is to follow.

A train leaves Binton at about 2.5, arriving at Bidford at 2.18. As it is 10-minutes walk from the station to the bridge at Bidford, the rest just enjoyed will now be appreciated.

The Falcon, where Shakespeare outdrank the natives, is no longer an inn, but it has good points, particularly so in its chimneys. It

also is the first thing, with the church, one notices on reaching the town. From hence to the bridge is but a few yards. Cross the

Negative by R. Aspa. BIDFORD CHURCH.

Negative by R. Aspa. BIDFORD BRIDGE.

bridge at once and explore both to right and to left on the other side. On the eastern side the illustration, with church here in-

serted, was taken, with some other good bits; while on the western side a dozen plates may be exposed with advantage. Here let me remark that having noticed how professional portraitists always take two or three negatives of each sitter, knowing that one of them is certain to excel the others, I have found it a desirable thing to take two shots at every good subject in places that I am not likely to visit again. Apart from the chance of accidents,

Negative by R. Aspa.

BRIDGE AND PUDDLE WEIR AT BIDFORD.

which in spite of the greatest care will nevertheless often spoil our best negatives, I have usually found that of two plates exposed on the same scene, under similar conditions, one has turned out better than the other, and, as often as not, this has been the second one.

Bidford Bridge is said to have been built in the 15th century, and to have been repaired in 1541 with stone from Alcester Priory. The pictures about this place are made presentable as to fore-

grounds by the long grasses, the reflections in the stream, and by broken banks. But one of the best subjects, or, indeed, series of

Negative by R. Aspa.

MILL-RACE, BIDFORD.

subjects, that the place affords, is to be found at an old deserted mill, the road to which runs between the Falcon and the church.

Negative by R. Aspa.

BIDFORD CHURCH FROM BARTON FIELDS.

It is a good walk there—across fields—and for reasons already discussed a guide should be taken.

The illustrations were done under a cloudy sky, which, to my mind, harmonized with the scene. But good pictures can of course be made in any light with such material.

Negative by R. Aspa.

DESERTED MILL AND WEIR, BIDFORD.

By the time this programme has been got through, the most energetic amateur will feel he has done enough. And before taking train he will probably take some restorative to save both himself and the town from the risk of collapsing.

And now let me add that though the very air of Bidford—let us say its psychological influence—invites to imbibition, and that a drink there should be hearty and without stint, it by no means follows, now-a-days, that our potations must be as strong as they are perhaps expected to be deep. On the contrary, those enamored of the cup "that cheers, but not inebriates," will find "teas provided" at, as it appeared to me, about every third house in the place. For my own part, though chiefly a water-drinker, I thoroughly enjoyed a glass of fine ale, drawn clear and cool as the brook immortalized by Tennyson. The inadequacy of this to the occasion was, however, made evident by mine host, who, while serving it, eyed me with a glance of curious inquiry as to how the spell might work. Yes—charmed—I took the second glass Prospero had ready, and in the 6.25 train, which goes conveniently by Fenny Compton to Leamington, I dozed all the way, and had pleasant dreams of Orlando and Rosalind, and of the Forest of Arden, within whose bounds had lain the whole of this day's excursion.

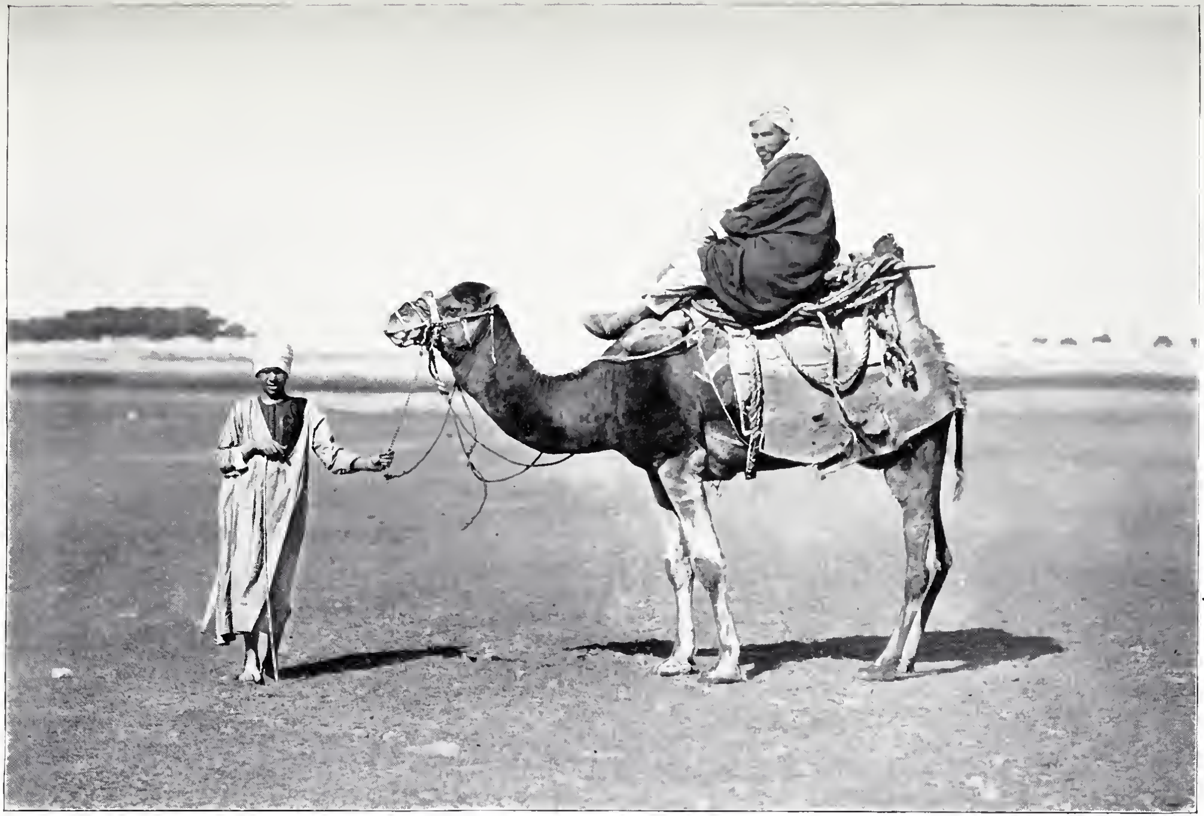


PHOTO BY H. W. GRIDLEY.

ENGRAVED BY HAGOPIAN PHOTO-ENGRAVING CO.

BEDOUIN AND CAMEL.

A SAFE PLATE-HOLDER.

By O. G. Mason, Bellevue Hospital, New York.

AMONG the many tribulations which beset the pathway of photographers, but few are more provocative of words not generally used in polite society than a leaky plate-holder. After spending many hours, or possibly days, in the preparation of a specimen, or in reaching and waiting for favorable conditions to secure a good plate of some distant object, to find upon development that the plate is "light-struck" by the imperfect working of the plate-holder, is not satisfactory to either amateur or professional. In out-of-door work, especially with large cameras, the slide and cut-off are sources of a great share of the trouble met with. Even in a light breeze and under favorable conditions it is no easy matter to withdraw and replace the slide in such a way as to completely exclude all light from passing the cut-off, especially if this latter part of the holder is some rigid material like hard rubber, iron or wood. Unless the end of the slide is entered exactly parallel with the cut-off, more or less light is sure to find its way in if the holder is not kept in the dark by the aid of the focusing cloth or some similar material. This is not an easy matter in a gale, especially if working alone, and the drawing of a large slide is often inconvenient from lack of space or liability to move the camera.

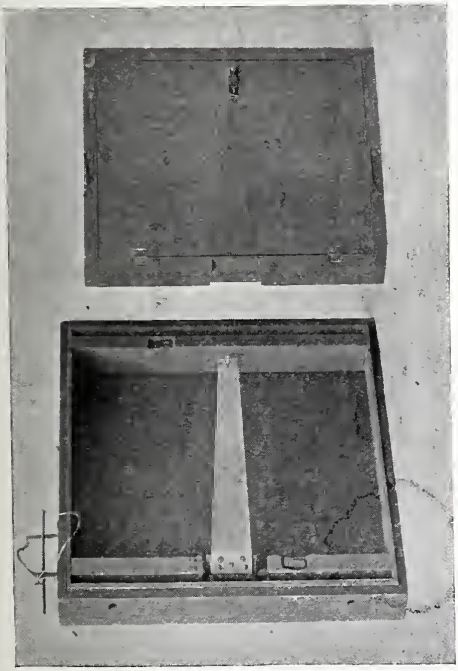


Fig. 1.

For the purpose of obviating such trouble and with a view to securing certainty of results, the apparatus herewith described and

illustrated was devised. The plate-holder proper is simply a box with hinged door or doors, provided with a flexible or other method of attachment to the end of the arm actuated by rotation of the small shaft passing through the edge of the plate-holder carrier, shown in Fig. 1. This carrier is a light open shell of thin wood or other material, and is attached to the back of the camera by hooks, springs or any of the methods used with ordinary plate-holders.

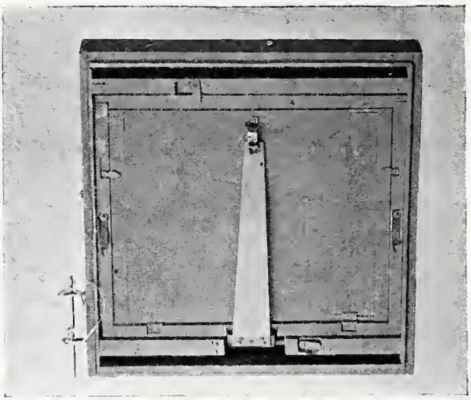


Fig. 2.

The outer end of the shaft actuating the arm for opening the door of the holder is provided with a thumb-wheel or cross-bar, or any other convenient device for turning and holding it in open or closed positions; one of the simple forms is shown in Fig. 3. The small rod passing through the shaft serves as a lever to turn it by and to hold the shaft in position to keep the door closed, as shown in Fig. 2. The plates may be put in and held in the holders by any of the usual methods. The doors are kept closed by the small buttons until pressure of the arm is secured, as seen in Fig. 2, while other buttons keep the holder in the carrier, from which it is lifted by the leather straps seen below the buttons. These straps are seen raised out of their beds in Fig. 3.

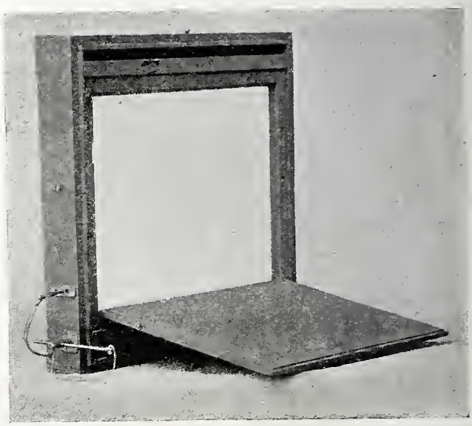


Fig. 3.

The accompanying illustrations were made from a rough, hastily

constructed carrier and holder which was devised to meet the requirements of a sudden call for work with a large camera, where light-struck plates from defective plate-holders would for ever prevent the securing of the pictures, for they could never be duplicated. The writer now has among his collection, plate-holders, 4x5 in size, constructed on this plan, which, with their carrier, weigh less than two ounces each. As one carrier serves for any number of the holders, the whole affair is simple and is easily made.

SWING BACK AND SWING FRONT.

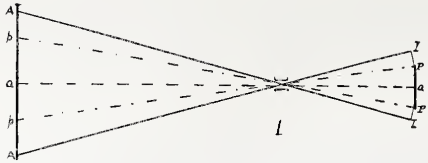
By C. H. Bothamley, Weston-super Mare, England.

THE uses of the swing-front and swing-back have always a considerable practical interest, and the appearance on the English market of a camera having a swing-front with a wide range of rise and fall, which is said to make the use of a swing-back unnecessary, tempts one to endeavor to set out concisely the various considerations that are involved in the use of the swing-front and swing-back, either separately or together.

The swing-front, by means of which the principal axis of the lens may be inclined to the base of the camera, is, of course, quite distinct from the well-known rising and falling front which keeps the axis of the lens parallel with the camera base. For various reasons, however, and more particularly because a swing-front, as a rule, can be made to either rise or fall, it is impossible to leave the effects of a rise and fall, as such, out of consideration when discussing the swing of either front or back.

In the first place it is essential to keep in mind all through the discussion certain properties of the lenses and certain defects of the images that they produce.

The rays of light that enter the lens from the object form a cone, and after they have passed through the lens they again form a cone, the base of which is made up of the points constituting the image. This is shown in section in Fig. 1, AA being the object and II the image. The size of the cones, so far as concerns the angle at the apex of each, and consequently the width of the base,



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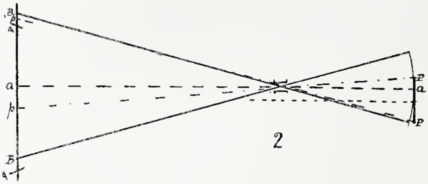

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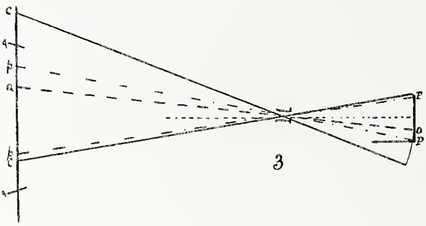

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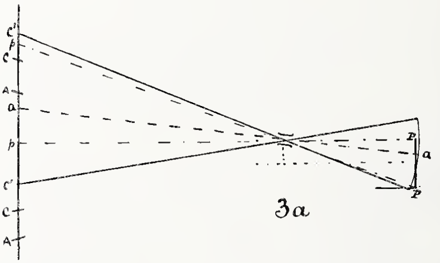

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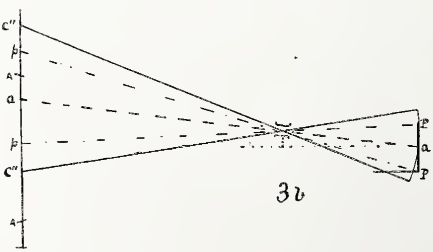

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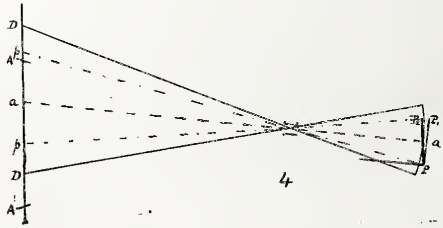

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is determined by the form and construction of the lens. From our present point of view, however, the essential fact is that there is a limiting cone of rays: only a certain area of object can be projected on the focusing screen by a particular lens, and the image also forms a limited circle outside of which there is no image. After a little experience every photographer learns that a given lens will "cover" only a given size of plate, and if he uses a larger plate, no image is formed on the corners of it.

Again, the image II is not formed on a plane surface, but on a spherical surface, and its general quality, so far as regards definition and freedom from distortion, as a rule, falls off as we proceed from the centre to the edge of the circle. The main efforts of opticians during the past few years have been directed to such alteration in the form of the lens as shall cause the image to be formed on a surface as nearly plane as possible, and to be as well defined and as free from distortion at the edges of the disc as at the centre. A wonderful degree of success has been attained in both

PHOTO BY ROBERT E. M. BAIN. ENGRAVED BY N. Y. ENGRAVING AND PRINTING CO.

STREET IN NATIVE DISTRICT, CAIRO, 1894.

respects, but the new lenses are very expensive, and in the lenses used by the majority of photographers the defects referred to are still readily recognizable.

What, then, we have to keep in mind in considering the effects of swing-front and swing-back is (1) that the image formed by the lens occupies a disc of a certain size only, and therefore will not cover more than a certain size of plate; and (2) that, as a rule, the quality of the image, as regards definition, distortion, etc., is highest at the centre of the disc, and becomes worse and worse as we approach the edge.

Now let us turn to the diagrams. In all cases the line *aa* is the principal axis of the lens; PP is the plate, *pp* is the area of the object grasped, so to speak, by the lens. In Figs. 1, 2, 3 and 4 we are supposed to be working under the most favorable conditions, or in other words, the plate used, PP, is considerably within the "covering power" of the lens.

Fig. 1. The lens is horizontal and in its normal position, exactly opposite the centre of the plate. It is capable of including an object AA and of producing an image of diameter II, but since a comparatively small plate is used, only the object *pp* is actually photographed. Under these conditions the plate receives only the central, or in other words the best, portion of the image.

Fig. 2. Here the rising front has been used, and whilst the lens still remains horizontal, its axis has been raised so that it no longer is opposite the centre of the plate, but points towards the top. Under these conditions it takes in a more elevated section of the object, but the image falling on the plate to a large extent is formed by the rays towards the edge of the disc, and will therefore be generally inferior in quality, and much more stopping down will be required.

Fig. 3. Here the lens has not been raised as when the rising front is put into operation, but it has been tilted by using the swing-front. The first effect is, of course, that the principal axis *aa* is no longer normal to the surface of the plate. The displacement of the cone of light makes the plate receive, not the centre of the image-disc, but the upper half of it, and with too much tilting it may be that the upper corners of the plate are no longer covered. It is clear that as in case 2 the best part of the image is not falling on the plate, but to some extent this is compensated for by the fact that the tilting of the lens makes the plane of the image almost coincident with the surface of the plate. There is, however,

another important point, and that is that the image that is thrown on the plate, so long as it retains its original position and the lens is not raised as well as tilted, is an image of a section of the object only a little higher than that which it would have received with the lens in its original position.

If, however, the lens is raised as well as tilted we get the result represented in Fig. 3a. The image falling on the plate comes from a high section of the object, but it is clear that it is not the best part of the image, and considerable stopping down will be necessary. Moreover, unless care is taken, the lower corners of the plate may not be covered by the image.

Let us now suppose that in addition to being tilted the lens is raised, but only so much as is necessary to make the principal axis again fall on the centre of the plate. This is represented in Fig. 3b, and it is clear that whilst the image falling on the plate does not include quite such a high section of the object, it will be of good quality so far as concerns the upper part of the plate, but by no means so good on the lower part if the plate is in the position shown in the figure. By moving the plate a little forward the quality of the image will be made more uniform over the whole surface, and a moderate amount of stopping down will give sufficient definition. There will be no danger of the corners of the plate being left bare. Reference to Fig. 4 will show that if the conditions just mentioned are satisfied the result will be indistinguishable from that obtained by tilting the camera (and of course the lens with it) and bringing the swing-back into operation.

It is of great importance, however, to observe that the swing-front only produces the same effect as the swing-back if the lens is raised as well as tilted—moreover, is raised to such an extent as will make the principal axis of the lens fall on the plate at the same point and in the same direction as when the swing-back is used.

Fig. 4 represents the camera (and of course the lens) tilted, and the swing-back used to keep the plate vertical. An image of a high section of the object falls on the plate, and since the principal axis of the lens falls on the centre of the plate, an image of fairly uniform quality is obtained, but some stopping down is necessary to secure good general definition, because the plate cuts the plane of the image instead of being as nearly coincident with it as possible. There is of course little danger of the plate not being properly covered.

It is clear that if the plate actually used is considerably smaller than the largest plate that the lens will cover, the swing-front will, under a certain set of conditions, produce results indistinguishable from those obtainable by means of the swing-back.

If on the other hand the plate used is the maximum size that the lens will properly cover, it is equally clear that the swing-front and rising front are of little avail, because as soon as they are brought into active operation two corners of the plate will most likely be left uncovered. Under these conditions, then (and they are not uncommon in practice), the swing-front cannot replace the swing-back, and the latter only will produce the desired result.

It is scarcely necessary to point out that the swing-front also cannot replace the swing-back when the latter is used for getting distant objects in focus at the same time as the foreground.

SEPIA TONES IN PLATINUM PRINTS.

By J. Joé, Germany.

THE popularity of platinotype prints grows daily, and this is particularly noticeable in the increased number of large prints and exhibition pictures produced by the platinum process. As with all new photographic processes, the platinotype processes have been considerably modified, and particular attention is here given to the method of obtaining a handsome sepia tone. In the hot bath process the sepia tone was usually obtained by the addition of mercury bichloride and subjecting the developer to a high temperature. According to Lainer, this creates a tendency for the formation of a brown tone. Mercury was also added to the sensitizing solution. But in the cold bath process the composition of the sensitive solution had to be much more complicated. Hübl recently recommended the use of a palladium salt to obtain a sepia tone. The use of palladium in photography is by no means new, and chloride of palladium is recommended a good deal at the present time as a toning agent. The direct application of this material for sepia pictures is brought about by adding to the direct printing platinum solution some chloride of palladium. The composition of the solution, according to Hübl, is as follows:

Platinum solution	1:6	4 cc.
Soda iron solution	1:2	6 cc.
Chloride of palladium solution	1:8	1 cc.

The paper is previously sized with arrow-root, as gelatine preparations have always a tendency towards the production of black and bluish tones. The paper must be thoroughly dry, and not damp, when put into the printing frame, or black instead of brown tones will be obtained. The results are much better than those obtained, in the hot bath process, with mercury.

Imitations of mercury sepia tones are easily made. Intense brown pictures I obtained by the following simple process: A print was made upon matt gelatino-chloride of silver paper, it being washed and fixed in the usual manner. Thereupon it was treated with the ordinary acid platinum bath. The tone changed very slowly, passing gradually from a light brown to a magnificent sepia tone. This sepia tone can also be obtained, but not so surely, by toning before fixing, only until the print appears in a deep violet tone. A sure method, too, for sepia tones on this gelatine aristotype paper is toning with palladium. The bath consists of

Sat. sol. palladium chloride.......20 drops.
Citric acid ....4 grms.
Water ....300 cc.

The pictures must be deeply printed, and all soluble silver salts must be washed out before toning or the bath will decompose.

Sepia tones which resemble those in the hot bath process with mercury are also obtained, according to Valenta, in the following bath:

Solution A.

Biphosphoric acid ....50 grams.
Water ....500 cc.

Solution B.

Potassium oxalate ....100 grams.
Water ....500 cc.

A and B are mixed, and before using, one cc. of potassium chloro-platinite solution (1:10) is added to each 100 cc. of the mixed solution. The toning proceeds until the tone in its transparency, that is, by transmitted light, appears quite gray, and the fixing is done in a fresh ten per cent. hypo bath. The tone will then change to a sepia. If a combined toning and fixing bath is used, after the toning, a bluish black tone will result.

AN OLD PROCESS WITH A NEW FACE.
ALBUMEN OPALOTYPES. . . . .

By Hy. Pickering, Leicester, England,
Hon. Sec. Leicester and Leicestershire Photographic Society.

IT has often been remarked that the old giveth place to the new, and the old is the better. In my humble opinion this ancient adage applies forcibly to the beautiful process of Albumen Opalotypes, which I present to the readers of the Annual as my annual contribution.

Those who practised the art in the "sixties" will not need to be reminded of the extreme beauty and bloom of the printed-out opals of that period, a color and tone far more beautiful than the cold bromide opal of the present day; and if they are now produced in seconds where the old process took minutes, it is at the cost of richness of color and depth of deposit.

Another consideration much in favor of the old process is that the plates or opals can be albumenized in any quantity, and, if carefully and equably dried, can be stored away for an indefinite period, and when required for printing it is only necessary to take them from the albumenized stock, sensitize and dry them, and they are as good as if freshly prepared from the beginning.

I prepare the opals in this manner, and as it is the result of several years' experience it can be relied on: Take the whites of fresh eggs, 2½ ozs., whisk to a froth, let it settle in a covered beaker all night, then dissolve 10 grains chloride ammonium in 1½ ozs. water, add to the albumen, whisk again, and filter through flannel. Do not prepare more salted albumen than is likely to be required for one batch of plates. Now coat the opal plates if for positives, or plain glass if for transparencies, and run it off from one corner into the sink; coat again and run off at the opposite corner, and dry off over a lamp or gas-stove and store away until required.

To sensitize, take 1 oz. silver nitrate and dissolve in 1½ ozs. water; take out one-third or about half an ounce of the silver solution and add liquor ammonia until the precipitate formed is nearly dissolved, then add it to the two-thirds; clear it up by the cautious addition of nitric acid, filter, and add the whole to 12 ozs. alcohol not methylated. Now to sensitize the plates: Warm the plate first—this is a *sine qua non*, or the resulting print will have

a dead sunk appearance. When quite warm, flow with the silver solution as if developing a wet plate, seeing that every portion is equally covered for about one minute—longer won't hurt; drain the plate, and if it drains in "tears," flow with pure alcohol; dry over very gentle heat or by fanning, and print at once. If the prints are not a good color, take a newly sensitized plate and fasten it film upwards with four tacks to the inside of the lid of a small wood box such as is used for confectionery; place inside the box on the bottom a saucer with about ½ oz. strong ammonia and close the lid; the film is now facing the ammonia and should be left to fume for 5 minutes, when it is taken out and printed, and will be found to print a good rich color. Wash in three changes of water; tone in any approved toning bath—I like acetate soda the best for warm tones, phosphate soda for cold tones, and chloride lime for rich purple—wash, fix in hypo 2 ozs. to the pint. Wash two hours, dry gradually, and the result will charm you. I may say I am mainly indebted for the rudiments of the above process, which have from time to time been improved on, to an old corresponding friend, of your country, Mr. William Bell, who was well known as an able operator and experimentalist in the early part of the "sixties."

DOUBLE EXPOSURES.

By Henry R. Procter, Ilkley, England.

AN eminent English professional photographer once showed the writer a landscape picture, and asked his opinion as to the cause of a slight peculiarity of appearance. Failing to elicit a satisfactory answer, he pointed out that it was an accidental double exposure, in which the water foreground of one landscape was so neatly combined with buildings and distance of another as to quite escape detection. Few of us have entirely failed in making double exposures, but fewer still have done it so successfully as in the case named; and though the appearance of a large cow, for instance, in the nave of a cathedral may be amusing, it is rarely satisfactory to the operator.

I may therefore assume that a little dodge which has saved me many a doubt as to which backs had been used, is not unworthy of mention in the International Annual, even though there

are several excellent devices of locks and danger-signals in the market which serve the same end. The method is intended for use with those backs, common in England at least, in which the sliding shutter is held down by a piece of bent wire screwed into the frame and acting as a turn-button; and it consists simply in placing a small scrap or slip of paper on the top of the sliding shutter in filling, so that it is held by the button. When the slide is drawn the paper naturally drops out and is lost. Where plates of different rapidities are used they are conveniently indicated by differently colored paper, or by letters or numbers written on the slips. In using holders of which the shutters withdraw entirely, and which usually have no catches, the same idea may generally be adapted by slipping a small square of stiffish paper in at the top of the slide, though where the shutter is reversible and of a different color inside, as is now so generally the case, no such device is needed.

PHOTOGRAPHY IN COLORS.

By the Editor.

SINCE the year 1848 it has been possible to obtain photographs in colors, but no method of fixation has, as yet, been devised. Edmund Becquerel, the French physicist, was able to make photographs in colors of such subjects as brightly dressed dolls, but no method of rendering the images obtained insensitive to farther action of the light suggested itself to him or to later workers. Becquerel's method consisted in exposing to the subject a thin film of silver chloride, supported on a silver plate, such as is used in daguerreotypy. This film of silver chloride he obtained by attaching the silver plate to the positive pole of a voltaic battery and immersing it in a solution of hydrochloric acid. The wire from the negative pole of the battery was attached to a strip of platinum and also immersed in the acid. When the deposit of chloride of silver had reached a certain stage, indicated by its color, the plate was washed, dried and gently heated. An exposure of a few minutes sufficed to give a colored image.

Poitevin, St. Florent and other investigators produced more or less unsatisfactory results, but no permanent colored pictures seem

to have been made until, quite recently, M. Gabriel Lippmann, of the Sorbonne, Paris, startled the photographic world with his photographs in colors. And yet even with this method we seem to be as far away from the practical solution of the problem as we ever were. By his method, colors approximating the originals may be obtained, but the photographs must be made on grainless plates, involving very prolonged exposures. Again, they do not permit of duplication, and the method, in so far as it has been worked out, seems to be possible only in the laboratory of the investigator. From a commercial point of view the process is worthless, and it seems to us that it must always remain so.

The necessity for a process of obtaining, directly, pictures in the colors of the originals need hardly be discussed, and the widespread applicability of such a process is well understood. It seems also that in an indirect process will be found the only practical solution of the problem, and this indirect process seems to have been already brought to a high state of perfection. The writer has now in his possession many transparencies which show the exact colors of the originals in all their brilliancy and perfection. In England, Professor Joly, and in America, Mr. James McDonough, have made public a method which seems to lack only the proper mechanical appliances to place on the market a process by which the photographer, without any radical departure from his present methods, may reproduce in colors any object whatever. The exposures are made through a screen, having ruled on its surface lines to the number of about 300 to an inch, these lines being alternately approximately red, green and blue. It has been stated by one high authority that it is not possible to rule glass in such colors with such a degree of fineness, yet the writer has both paper and glass having rulings thereon in the above colors and of the above fineness. The negative being made, the image appears to be made of a series of black lines, more or less broken up. From such a negative any number of transparencies may be made, all of which will, when placed in contact and in register with a somewhat different ruled color screen, give a transparency presenting all the colors of the original. By this method, therefore, without any great departure from ordinary methods, a negative may be obtained from which any number of transparencies may be made which have only to be placed in register with a ruled backing to give them color. Again, if sensitized paper be ruled with these same colors and then exposed beneath a nega-

tive made through such a screen as described, a print in colors may be obtained which may be fixed and mounted, and which may be looked upon as being permanent. Having before him the many transparencies alluded to, which include portraits from life, out-door views, and copies from paintings, the writer feels that the problem has been practically solved, and that in this method lies a means by which any one versed in ordinary photography may reproduce any object in the colors of the original.

Tables and Formulas.

DEVELOPERS.

PYROGALLOL.

CLIMAX.

A.

Water	80	ounces.
Sulphite (E. A.)	6	"
Pyro	1	"

B.

Water	80	ounces.
Carbonate soda (E. A.)	6	"

To use, take equal parts of A and B. In warm weather a little less carbonate may be used, and developer can be reduced with water. For over-exposure, use a few drops of a ten per cent. solution of bromide of ammonium.

Do not use an excess of sulphite of soda, simply enough to control color in the negative. Too much gives a cold, poor printing film.

CRAMER'S

Alkaline Solution.

Water	60	ounces	or	1800 cc.
Carbonate of sodium crystals (sal soda).	5	"	"	150 grams.
Sulphite of sodium crystals	10	"	"	300 "

A smaller quantity of sulphite will produce a warmer tone, a larger quantity a gray or bluish black tone.

The alkaline solution must be kept in well stoppered bottles.

If the negatives show a yellow stain make a fresh solution, or try another lot of sulphite of sodium.

For hydrometer test see note below.*

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*The alkaline solution can be made with the hydrometer by mixing equal parts of the following solutions:

Carbonate of sodium solution ... (hydrometer test 40).
Sulphite of sodium solution ......(hydrometer test 80).

Pyro Solution.

Distilled or pure ice water.............	6 ounces	or 180 cc.
Sulphuric acid	15 minims	" 1 cc.
Sulphite of sodium crystals............	1 dram	" 4 grams.
Pyrogallic acid	1 ounce	" 30 "

All pyro solutions work best while fresh.

Eight grains dry pyro may be substituted for 1 dram of this solution.

Mix in the following proportions:

Pyro solution	1 dram	or 10 cc.
Alkaline solution	1 ounce	" 80 cc.
Tepid water (for winter use)...........	2 ounces	" 160 cc.
or:		
Cold water (for summer use)...........	3 to 5 ozs.	" 240 to 400 cc.

If the high-lights are flat, use more pyro solution.

If they are too intense, use less pyro solution.

For Aristo negatives about one-half the quantity of pyro solution will be sufficient.

If too little pyro is used the alkali will be in excess and cause fog.

For negatives of great contrast, suitable for line engraving, use double the quantity of pyro solution, and add sufficient bromide of potassium solution to keep the lines perfectly clear.

For Transparencies.

Water	64 ounces.
Sulphite of soda	8 "
Carbonate of soda (crystals)	$2\frac{1}{2}$ "
Bromide of potassium	30 grains.

To every ounce of this solution add 3 to 5 grains of dry pyro. An excess of pyro will yield slides too heavy in the shadows and lacking in detail in the high-lights.

CARBUTT'S

No. 1.

Pyro Stock Solution.

Distilled or ice water	10 ounces	or 300 cc.
Oxalic acid	15 grains	" 1 gram.
Bromide of potassium	30 "	" 2 "

Then add Schering's pyro 1 ounce (30 grams), and water to make 16 fluid ounces (480 cc.).

No. 2.

Stock Soda Solution.

Water	10 ounces	or	300 cc.	
Sodium sulphite (crystals)	4 "	"	60	grams.
Soda carb. crystals (or dry gran. 1 ounce)	2 "	"	60	"
Potash carbonate	1 "	"	30	"

Dissolve, and add water to make measure 16 fluid ounces (480 cc.).

No. 3.

Bromide Solution.

Bromide of sodium or potassium, ½ ounce (14 grams). Water, 5 ounces (150 cc.).

For Developer.

Dilute 2 ounces of stock No. 2 with 7 ounces of water for cold weather, and 10 to 12 of water in summer. To 3 ounces of dilute No. 2 add 1½ to 2½ drams (6 to 10 cc.) of No. 1. The more pyro the denser the negative, and *vice versa.* No yellowing or fogging need be apprehended if the directions are followed. Development should be continued until the image seems almost buried, then wash and place in fixing bath.

For Instantaneous Exposures take for a 5x8 or 6½x8½ plate 3 ounces of dilute No. 2. Lay the plate to soak in this, and cover pan. Put 2 drams of No. 1 into the graduate, and 3 drops of bromide solution. Pour the soda solution off of the plate into the pyro and back over the plate; let development proceed, and examine occasionally. Keep solution in gentle motion over the plate. A *very* short exposure may take ten minutes to fully develop. If the image is not fully brought out this time, add to developer in pan three times its bulk of water, and let plate lie in it covered for half an hour or more if necessary, until full development is attained, then wash, and proceed as directed under head of developer.

HAMMER.

Solution No. 1.

	AVOIR.
Pure water	16 ounces.
Sulphite of sodium (crystals)	4 "
Oxalic acid	20 grains.

Dissolve, and add

Pyrogallic acid	1 ounce.

Solution No. 2.

Pure water ....16 ounces.
Sulphite of sodium (crystals) .... 4 "
Carbonate of sodium (crystals) .... 4 "

For use, take ½ ounce of each, No. 1 and No. 2, and 5 to 8 ounces tepid water in cool or cold weather, or 6 to 12 ounces cold water in warm weather.

Make stock solution of sulphite of soda to test 60 by hydrometer. Allow to settle perfectly clear.

No. 1.

Sulphite of soda solution, 60 test....................18 ounces.
Oxalic acid ....20 grains.
Pyrogallic acid .... 1 ounce.

No. 2.

Equal parts of sulphite of soda solution testing 60, and carbonate of soda solution testing 60.

To develop, take 1 ounce of No. 1, 2 ounces of No. 2, and 10 to 16 ounces tepid water in cool or cold weather, or 12 to 24 ounces cold water in warm weather.

Seed.

No. 1.

Make stock solution of sulphite of soda to test 60 with hydrometer, allow to settle perfectly clear, then take:

Sulphite of soda solution ....16 ounces.
Pyro .... 1 "
Sulphuric acid ....15 drops.
(or oxalic acid, 10 grains.)

No. 2.

Sal soda solution, hydrometer test 40.

To develop, take

Water ....12 ounces.
No. 1 .... 1 "
No. 2 .... 1 "

In warm weather use more water, in cold weather less.

AMERICAN.

No. 1.

Sulphite of soda (crystals)	60 grains.
Sulphuric acid (c. p.)	15 minims.
Pyrogallic acid	1 ounce.
Water	6 "

No. 2.

Sulphite of soda (crystals)	2 ounces.
Sal soda	1 "
Water	40 "

To develop, use 1 dram of No. 1 and 4 ounces of No. 2. For more intensity use more of No. 1. For more detail use more of No. 2.

FITCH'S.

Water	10 ounces.
Bromide of ammonium	30 grains.
Ammonia .880	60 minims.

Developer.

To each ounce of above add for use 1 to 2 grains dry pyro.

EASTMAN (for films).

Pyrogallic Acid Solution.

Pyrogallic acid	½ ounce.
Nitrous or sulphurous acid	20 minims.
Water	32 ounces.

Soda Solution.

Sulphite of soda (crystals)	6 ounces.
Carbonate of soda (crystals)	4 "
Water	32 "

To develop, take pyro solution, 1 ounce; soda solution, 1 ounce; water, 2 ounces.

HYDROQUINONE.

Carbutt.

A.

Warm distilled water	20 ounces	or	600 cc.
Sulphite soda (crystals)	4 "	"	120 grams.
Sulphuric acid	1 dram	"	4 "
Hydrochinon	360 grains	"	$23\frac{1}{2}$ "
Bromide potass.	30 "	"	2 "
Water to make up to	32 ounces	"	960 cc.

B.

Carbonate potash	2 ounces	or	60 grams.
Carbonate soda (crystals)	2 "	"	60 "
Water to make	32 "	"	960 cc.

C.

Accelerator.

Caustic soda	1 ounce	or	30 grams.
Water	10 ounces	"	300 cc.

For under-exposure add a few drops of above to developer.

D.

Restrainer.

Bromide potass.	$\frac{1}{2}$ ounce	or	14 grams.
Water	5 ounces	"	150 cc.

To Develop.

For instantaneous exposures, take—*A*, 1 ounce or 30 cc.; *B*, 1 ounce or 30 cc.; *water*, 4 ounces or 120 cc.

For portraits—*A*, 1 ounce or 30 cc.; *B*, 1 ounce or 30 cc.; *water*, 5 ounces or 150 cc.

For landscapes (Sen 20-27)—*A*, 1 ounce or 30 cc.; *B*, $\frac{1}{2}$ ounce or 15 cc.; *water*, 3 ounces or 90 cc.

For landscapes, full exposure (Sen 16-20)—*A*, 1 ounce or 30 cc.; *B*, $\frac{3}{4}$ ounce or 25 cc.; *water*, 4 ounces or 120 cc.

For lantern slides—*A*, 1 ounce or 30 cc.; *B*, $\frac{3}{4}$ ounce or 25 cc.; *water*, 4 ounces or 120 cc.

For lantern slides and full exposures—*A*, 1 ounce or 30 cc.; *B*, $\frac{3}{4}$ ounce or 25 cc.; *water*, 4 ounces or 120 cc.; and 2 to 6 drops Restrainer *D* to each ounce of developer. (See below.)

Note.—More of *A* will increase density, more of *B* will increase detail and softness. Temperature of developer should not vary

much below 65 degrees nor above 75 degrees. The after-treatment is the same as with any other developer.

Seed.

A.

Hydrochinon	1 ounce.
Sulphite of soda (crystals)	5 ounces.
Bromide of potassium	10 grains.
Water (ice or distilled)	55 ounces.

B.

Caustic potash	180 grains.
Water	10 ounces.

To Develop.

Take of A, 4 ounces; B, ½ ounce. After use pour into a separate bottle. This can be used repeatedly and with uniformity of results by the addition of one drachm of A and 10 drops of B to every 8 ounces of old developer.

In using this developer it is important to notice the temperature of the room, as a slight variation in this respect causes a very marked difference in the time it takes to develop, much more so than with pyro. Temperature of room should be from 70 to 75 degrees Fahr.

Byk's.

Hydroquinone	5	grams.
Potassium carbonate	75	"
Sodium carbonate	40	"
Water to make	1,000	"

Mix in reverse order.

Developer.

Use full strength.

Dr. Just's.

No. 1.

Hydroquinone	10	parts.
Sulphite of sodium	60	"
Distilled water	240	"

No. 2.

Carbonate of potassium	120	parts.
Acetic acid	15	"
Distilled water	480	"

Developer.

Mix the solution in equal parts for use. The best results are obtained by commencing development with an old or once-used developer, and, when development is half-completed, applying fresh.

MIETHE.

No. 1.

Sulphite of soda	35	grams.
Yellow prussiate of potash	30	"
Hydroquinone	7	"
Water	550	cc.

No. 2.

Caustic potash	30	grams.
Water	550	cc.

To develop, use 3 parts of No. 1, and 2 to 3 parts of No. 2, according to exposure and desired density.

EDWARD'S.

Carbonate of sodium (granulated)	100	grains.
Sulphite of sodium (crystals)	480	"
Hydroquinone	100	"
Water	14	ounces.

Developer.

Use full strength.

EIKONOGEN DEVELOPER.

CRAMER.

No. 1.

		Troy Weight.		
Distilled water	hydrometer	40	ounces or	1200 cc.
Sulphite of sodium (crystals)	test 15.	2	" "	60 grams.
Eikonogen		1	" "	30 "

Boil for a few minutes. After cooling, pour into a bottle and keep it well stoppered.

No. 2.

Water	10 ounces or	300 cc.
Carbonate of potassium	1 " "	30 grams.

For Use.

Solution No. 1	3 ounces or	90 cc.
Solution No. 2	1 " "	30 cc.

In hot weather dilute with an equal quantity of cold water. This developer can be used repeatedly by occasionally adding more of solutions No. 1 and 2.

To obtain thin negatives, full of detail, such as are required for printing on Aristo paper, use the developer more diluted.

For negatives of greater intensity add to solution No. 1:

Hydrochinon .... 1 dram or 4 grams.

Seed.

Make stock solution of sulphite of soda 40 by hydrometer test.

No. 1.

Hot water .... 30 ounces.
Eikonogen .... 1 "

Thoroughly dissolve, then add:

Sulphite of soda solution .... 10 ounces.

No. 2.

Sal soda, 12 hydrometer test.

To develop, take equal parts of Nos. 1 and 2; water, 1 ounce.

If more contrast is required, increase the amount of No. 1; if less, more of No. 2. The developer can be used repeatedly by adding each time a little of each of fresh solutions Nos. 1 and 2, according to above proportions.

Hammer.

Solution No. 1.

Pure hot water .... 45 ounces.
Sulphite of sodium (crystals) .... 3 "

Dissolve, and add

Eikonogen .... 1 "

Boil five minutes; when cool, filter.

Solution No. 2.

Pure water	15 ounces.
Carbonate of potassium	$1\frac{1}{2}$ "

For use, take three parts of solution No. 1 and one part of solution No. 2.

Make stock solution of sulphite of soda 40 by hydrometer.

No. 1.

Hot water	30 ounces.
Sulphite of soda solution (40 hydrometer test)	10 "
Eikonogen	1 ounce.

To develop, take Nos. 1 and 2, equal parts.

No. 2.

Carbonate of soda solution (12 hydrometer test).

Bromide Solution.

Pure water	10 ounces.
Bromide of potassium	1 ounce.

When the developing solution is quite new, it may be necessary to add to it 6 to 12 drops of the bromide solution to make it work perfectly clear.

American.

No. 1.

Sulphite of soda (hydrometer test 30)	40 ounces.
Eikonogen	1 ounce.

No. 2.

Potassium carbonate to test 10°.

To develop, use equal parts. For more contrast use more of No. 1. For more detail use more of No. 2.

EIKONOGEN AND HYDROQUINONE DEVELOPER.

Climax.

No. 1.

Water, distilled or ice	40 ounces.
Eikonogen	336 grains.
Hydroquinone	144 "
Sulphite of soda (crystals)	3 ounces.

No. 2.

Water, distilled or ice	40	ounces.
Sulphite of soda (crystals)	1	"
Carbonate of soda	4	"

For use, mix two ounces No. 1, one ounce No. 2. Can be used over and over by adding a little fresh developer each time. Any amount of density may be obtained with this developer by varying the proportions and a normal exposure. A few drops of 10 grains solution bromide of ammonium may be used to start off with on first plate; after that regulate by using more or less of old developer in the new.

Carbutt's.

A.

Distilled water	20	ounces	or	600	cc.
Sulphite of soda (crystals)	4	"	"	120	grams.
Eikonogen	330	grains	"	22	"
Hydrochinon	160	"	"	10½	"
Water to make up to	32	"	"	960	cc.

B.

Distilled water	20	ounces	or	600	cc.
Carbonate of potash	2	"	"	60	grams.
Carbonate of soda (crystals)	2	"	"	60	"
Water to make up to	32	"	"	960	cc.

To develop, see Carbutt's hydroquinone developer.

Seed.

No. 1.

Water	12	ounces.
Sulphite of soda	720	grains.
Eikonogen	144	"
Hydroquinone	48	"

No. 2.

Water	12	ounces.
Carbonate of potash	192	grains.

For use, half of each.

FERROUS OXALATE.

Neutral oxalate of potash, saturated solution. Protosulphate of iron, sat. sol. 10 drops sulphuric acid.

To Develop.

Oxalate solution	10	ounces.
Iron solution	2	"
Old (used) developer	2	"

METOL.

CRAMER'S.

Water	25	ounces.
Sulphite of sodium (crystals)	$2\frac{1}{2}$	"
Metol	3	drams.
Bicarbonate of soda	1	ounce.

Bromide of potassium solution a few drops, if necessary.

Dissolve in the given rotation.

This developer keeps well, and as the bicarbonate of soda is a very mild alkali, it is not liable to injure the film.

Water	20	ounces.
Carbonate of soda (crystals)	300	grains.
Sulphite of soda	500	"
Hydrochinon	30	"
Metol	30	"

For use, add equal amount of water.

For Transparencies.

Water	40	ounces.
Carbonate of soda (crystals)	360	grains.
Sulphite of soda (crystals)	500	"
Hydrochinon	30	"
Metol	30	"

Dissolve the carbonate and sulphite, and then add the hydrochinon and metol.

Clearness is the first requisite in a good lantern slide.

BLAIR.

Solution No. 1.

Water	30 ounces.
Metol	105 grains.
Sulphite of soda (crystals)	$2\frac{3}{4}$ ounces.

Solution No. 2.

Water	30 ounces.
Carbonate of potash	$2\frac{3}{4}$ "

Mix each solution in the order given, viz.:—

Solution No. 1. Dissolve 105 grains metol in 30 ounces of water; after thoroughly dissolved add $2\frac{3}{4}$ ounces sulphite of soda.

Filter through absorbent cotton in a funnel.

Solution No. 2 is treated in the same manner.

To develop, take equal parts of No. 1 and No. 2 in a quantity sufficient to make the solution about half an inch deep in the developing tray.

The following conditions are peculiar to the film during development with this developer. The image will appear in from three to five seconds if the plate is fully timed, but the film should be developed until the high-lights are very intense, as the negative will fix out more than it would if developed with any developer now in general use.

GLYCIN.

EDER.

Glycin	5 parts.
Sodium sulphite	15 "
Potassium carbonate	25 "
Water	90 "

For use, dilute with 3 to 4 volumes of water.

FIXING BATHS FOR PLATES.

HEMPERLEY'S.

Take thirty-two ounces sulphite of soda (hydrometer test 60), add to this one ounce sulphuric acid very slowly, and eight ounces solution of chrome alum (hydrometer test 60), then add the whole to two gallons saturated solution of hypo, and it is ready for use.

Leave the negative a few minutes longer in the bath than is required for fixing. This is important, as the permanency of the negative depends upon it. Don't use a flat tray to fix in, it causes spots and dirt; use a grooved box.

Laborie's.

Bisulphite of soda	100 grams.
Hyposulphite of soda	150 "
Water	1,000 cc.

Carbutt's.

Sulphuric acid	1 dram	or	4 cc.
Hyposulphite of soda	16 ounces	"	480 grams.
Sulphite of soda	2 "	"	60 "
Chrome alum	1 "	"	30 "
Warm water	64 "	"	1,920 cc.

Dissolve the hyposulphite of soda in 48 ounces (1440 cc.) of water, the sulphite of soda in 6 ounces (180 cc.) of water, mix the sulphuric acid with 2 ounces (60 cc.) of water, and pour slowly into the sulphite of soda solution, and add to the hyposulphite, then dissolve the chrome alum in 8 ounces (240 cc.) of water and add to the bulk of solution, and the bath is ready. This fixing bath will not discolor until after long use, and both clears up the shadows of the negative and hardens the film at the same time.

After negative is cleared of all appearance of silver bromide, wash in running water for not less than half an hour to free from any trace of hypo solution. Swab the surface with wad of wet cotton, rinse, and place in rack to dry spontaneously.

American.

Citric acid	160 grains.
Hyposulphite of soda	1 pound.
Water	32 ounces.

First dissolve the citric acid, add the hypo and allow to settle.

Cramer's.

The negatives may be fixed in a plain hypo bath, 1 part hyposulphite of soda to 4 parts of water, but the following bath is especially recommended.

Prepare two solutions.

No. 1.

Hyposulphite of soda	32 ounces	or	1 kilo.
Water	3 quarts	"	3 liters.

No. 2.

Water	1 quart	or	1 liter.
Sulphuric acid	½ ounce	"	15 cc.
Sulphite of sodium (crystals)	4 "	"	120 grams.
Chrome alum	3 "	"	90 "

After the ingredients are dissolved pour No. 2 solution into No. 1. During the cold season one-half the quantity of No. 2 is sufficient.

Alum and Citric Acid Bath.

No. 1.

Alum	10 parts.
Water	100 "

No. 2.

Sulphite of soda	20 parts.
Citric acid	3 "
Water	100 "

No. 3.

Hypo	40 parts.
Water	100 "

Use three parts of No. 1, three of No. 3, and one of No. 2. The citric acid tends to prevent the formation of the precipitate which often forms in the alum hypo fixing bath.

DEFECTS IN NEGATIVES.

Foggy Negatives.—Caused by over-exposure; white light entering camera or dark-room; too much light during development; decomposed pyro; introduction of hypo or nitrate of silver into the developing solution from the fingers or from tablets used for wet plates; developer too warm or containing too much carbonate of soda or potassium.

WEAK NEGATIVES WITH CLEAR SHADOWS.—Under-development.

TOO STRONG WITH CLEAR SHADOWS.—Under-exposure.

WEAK NEGATIVE WITH PLENTY OF DETAIL IN THE SHADOWS.—Want of intensity, caused by over-exposure. Shorter exposure with longer development will, in most cases, produce sufficient intensity, and an addition of more pyro stock solution to the developer will seldom be necessary.

FINE TRANSPARENT LINES.—Using too stiff a brush in dusting off plates.

TRANSPARENT SPOTS AND PIN HOLES.—Dust on plate or in camera, or scum on old developer, or air bubbles while developing. Developer must be perfectly clean.

CRYSTALLIZATION ON THE NEGATIVE AND FADING OF IMAGE.—Imperfect elimination of the hypo.

YELLOW COLORED NEGATIVES are caused by not using enough sulphite of sodium in developer, or if the article used is old and decomposed.

YELLOW STAINS are caused by using old hypo bath which has assumed a dark color, or by not leaving plate in hypo bath long enough.

MOTTLED APPEARANCE OF NEGATIVE is caused by precipitation from fixing bath containing alum, if the solution becomes old or if it is turbid.

To Clean Negatives Stained by Silver.

Take a plug of cotton-wool and wet it well with a weak solution of cyanide of potassium; rub gently all over the negative, using a little more force on the stained parts. Well wash. Dry on blotting-paper. If necessary to revarnish, flood the plate once or twice with methylated spirit. Let dry, and then varnish in the ordinary way.

Soaking Solution for Films.

BLAIR.

Alcohol	4	ounces.
Glycerine	½	"
Water	16	"

EASTMAN.

Water	32	ounces.
Glycerine	1	"

To Strip Film from Ordinary Plates.

Give negative two coats of 2 per cent. collodion. The following formula yields good results.

Negative cotton	30 grains	or 2 grams.
Ether	1 ounce, 6 dr.	" 50 cc.
Alcohol	1 " 6 "	" 50 cc.

Allow the first coat to dry before applying the second, and when second coating has set, place immediately in cold water until greasiness has disappeared, then place in a bath of

Sodium fluoride (com.)	5 drams	or 20 grams.
Water	5 ounces	" 160 cc.

When thoroughly saturated with this solution, which will take at least an hour, place without washing in

Water	7 ounces	or 196 cc.
Sulphuric acid	1 dram	" 4 cc.

Rubber trays should be used for this and the fluoride bath. When film begins to loosen, lay a piece of writing paper or celluloid upon it as a support, and separate the two from the glass. After washing well under tap it can be transferred to a permanent support.

The following will answer the purpose: Coat a clean glass plate which has been rubbed with French chalk and dusted, with

Gelatine	2½ ounces	or 75 grams.
Water	16 "	" 500 cc.
Glycerine	3 drams	" 10 cc.

Filter before coating through canton flannel and avoid air bubbles. Coat on a leveling stand as thick as the plate will hold, allow to set and dry.

Clearing Solution to Remove Yellow Stain Caused by Developer.

Sulphate of iron	3 ounces	or 90 grams.
Sulphuric acid	1 "	" 30 cc.
Alum	1 "	" 30 grams.
Water	20 "	" 600 cc.

First well wash to remove all hypo from negative, then immerse in the above solution until the stain is removed; again wash well and dry.

INTENSIFYING SOLUTIONS.

Cramer's.

Prepare a saturated solution of bichloride of mercury in water, and pour of this a sufficient quantity gradually into a solution of

Iodide of potassium	1¼ ounce or 50 grams.
Water	6 " " 250 cc.

until the point is reached when the forming red precipitate will no longer dissolve by shaking; but be careful not to add more mercury than just enough to make the solution very slightly turbid. Now add

Hyposulphite of soda	1 ounce or 40 grams.
Dissolve and add water to make 20 ounces solution	800 cc.

For use, this should be diluted with about three parts of water. If the plate has not been thoroughly fixed, the intensifying solution will produce yellow stains. Be careful not to overdo the intensifying. Should it have gone too far, the negative can be reduced by placing it in the fixing bath for a short time.

Scolik.

The fixed and well-washed negative is allowed to remain in the following mercuric chloride bath until the film is thoroughly whitened:

Bichloride of mercury	1 part.
Potassium bromide	1 "
Water	50 "

The bleaching being complete, the mercuric solution is rinsed off, and the negative is immersed in a mixture of equal parts of saturated solution of sodium sulphite and water; the darkening action will be seen to take place steadily and slowly, just as when ammonia is used. Wash away the excess of sulphite.

Climax.

No. 1.

Bromide of potassium	1 ounce.
Water	16 ounces.

No. 2.

Bichloride of mercury	1 ounce.
Water	16 ounces.

No. 3.

Sulphite of soda	strong solution.

To intensify, soak plate well in water and then immerse plate in No. 1 for about five minutes; then pour off and flow plate with No. 2 till desired intensity is obtained. Wash well and immerse in No. 3 till plate resumes its natural color. Wash well and then dry.

Carbutt.

Intensification.

With correct exposure and development, intensification need never be resorted to. The following formula is, however, very effective, and the most permanent of all methods:

No. 1.

Bichlor. mercury	240 grains	or	16 grams.
Chloride of ammonium	240 "	"	16 "
Distilled water	20 ounces	"	600 cc.

No. 2.

Chloride of ammonium	240 grains	or	16 grams.
Water	20 ounces	"	600 cc.

No. 3—*Cyanide Silver Solution.*

Distilled water	6 ounces	or	180 cc.
Cyanide potass. C. P.	60 grains	"	4 grams.
Distilled water	2 ounces	"	60 cc.
Nitrate of silver	60 grains	"	4 grams.

Pour the silver into the cyanide solution while stirring, and mark bottle "Poison."

Let the plate to be intensified wash for at least half an hour, then lay in a 5 per cent. solution of alum for ten minutes, and again wash thoroughly; this is to insure the perfect elimination of the hypo. The least trace of yellowness after intensifying shows that the washing was not sufficient.

Flow sufficient of No. 1 over the negative to cover it, and allow to either partially or entirely whiten; the longer it is allowed to

act the more intense will be the result; pour off into the sink, rinse and flow over No. 2, and allow to act one minute; wash off, and pour over or immerse in No. 3 until changed entirely to a dark brown or black. No. 3 can be returned to its bottle, but Nos. 1 and 2 had better be thrown away. Wash thoroughly and dry.

American.

No. 1.

Bichloride of mercury	31 grains.
Water	4 ounces.

No. 2.

Sulphite of soda (crystals)	154 grains.
Water	3 ounces.

The negative is laid in No. 1 until intensified sufficiently and washed thoroughly, then put in No. 2, when it returns to the original color. Wash for one-half hour and dry.

REDUCING SOLUTIONS FOR NEGATIVES.

Dissolve 1 part red prussiate of potash in 15 parts of water. Wrap the bottle in yellow wrapping paper, as the solution is affected by light and will not keep long. Immerse the negative in a hypo solution—1 part hypo to 15 parts of water—to which has been added a little of the above immediately before use. When reduced sufficiently, wash thoroughly.

Cyanide Reducing Solution.

Cyanide of potassium	20 grains.
Iodide of potassium	10 "
Bichloride of mercury	10 "
Water	10 ounces.

Reduction takes place slowly and is easy to control. After reducing, the negative should be washed thoroughly.

No. 1.

Hyposulphite of soda (crystals)	772 grains.
Water	8 ounces.

No. 2.

Ferricyanide of potassium .... 76 grains.
Water .... 6 drams.

To Reduce, Use

No. 1, 5 ounces; No. 2, 2 drams.

Potassium ferricyanide .... 1 ounce or 30 grams.
Distilled or melted ice water ....16 fluid ounces or 500 cc.

Keep the above solution in the dark when not in use. To reduce a negative, immerse it in hypo solution of a strength of about one ounce of hypo to a pint of water, to which a small quantity of the reducing solution has been added. To reduce locally, immerse the plate for a few minutes in water and apply the mixed solution with a camel's hair brush to the part required. Silver stains may also be removed after wetting the plate by brushing them over with the solution. At the end wash thoroughly. The ferricyanide solution must be added to the hypo at the time of using, as the mixed solutions do not keep.

Perchloride of iron ....30 grains.
Citric acid ....60 "
Water .... 1 pint.

ORTHOCHROMATIC SENSITIZING BATHS.

VICTOR SCHUMANN.

Distilled water ....200 parts.
Alcohol .... 10 "
Ammonia, .900 .... 4 "
Alcoholic solution of cyanine (1.200) .... 10 "

Immerse the plate in water containing a little ammonia (3 pts. per 100) for two or three minutes, and then place in the above solution, drain and dry.

MALLMAN AND SCOLIK.

Preliminary Bath.

Water	200 cc.
Ammonia	2 "

Soak the plate for two minutes.

Color Bath.

Erythrosine solution, 1:1000	25 cc.
Ammonia	4 "
Water	175 "

The plate should not remain longer in this bath than one and a quarter minutes. A longer time reduces the general sensitiveness.

Alcohol	500 cc.
Chinoline red	1 gram.

To which add 50 cc. of a solution of

Alcohol	500 cc.
Chinoline blue (cyanine)	1 gram.

The above solution is identical with the liquid dye sold under the name "Azaline."

BLUE PRINT FORMULAS.

No. 1.

Citrate of iron and ammonia	$1\frac{7}{8}$ ounces.
Water	8 "

No. 2.

Ferricyanide of potassium	$1\frac{1}{4}$ ounces.
Water	8 "

Mix equal parts of No. 1 and No. 2, and apply with brush or by floating for three minutes. Plain Rives paper should be used; hang up to dry in darkened room.

Black Lines upon a White Ground.

Water	9 ounces.
Gelatine	3 drams.
Perchloride of iron solution (U. S. Ph.)	6 "
Tartaric acid	3 "
Ferric sulphate	3 "

Filter off any precipitate that may be found, and coat any good, stout white paper with the full strength solution. Expose in sunlight till details or lines are visible, and develop with

Gallic acid	6	drams.
Alcohol	6½	ounces.
Water	32	"

Wash well in several changes of water.

The sensitizing solution is as follows:

Gum arabic	15	grams.
Tartaric acid	2	"
Chloride of sodium (common salt)	9	"
Sulphate of iron	10	"
Iron perchloride	15	"
Water	110	cc.

In mixing the solution, the gum arabic is first dissolved in the water by the aid of heat, and the other salts are added while the solution is still warm.

The solution is spread over the surface of the paper with a sponge, and, after allowing a little time for it to penetrate the surface, all superfluous moisture is removed, using the sponge again, well wrung out. If this precaution be not attended to, the depth of the lines is not equal. The paper is then dried as quickly as possible. If the drying is not rapid the whites stain.

Exposure is somewhat longer than would be needed with sensitized albumenized paper. The color of the sensitized paper is yellow. During exposure all but the lines turns to white.

Development is by a plain aqueous solution of gallic acid, the strength of which is not important. Care must be taken not to leave the print too long in the developer, otherwise staining will result. After development the print is rapidly washed, when superfluous moisture is carefully sponged off the surface. If this precaution be not observed, inequality in the depth of the lines will result.

KALLITYPE PRINTING PROCESS.

Sensitizing Solution.

Ferric oxalate	75	grains.
Silver nitrate	30	"
Water	1	ounce.

This solution is swabbed over the paper with a wad of cotton wool, and the paper is dried before a clear fire. The above quantity will coat about ten square feet of smooth paper. Printing is done as usual with the platinotype process.

Developing Solution.

Rochelle salts	1 ounce
Saturated solution of borax	10 ounces.

Restrainer.

One per cent. solution of potassium bichromate.

After development the prints are washed in three or four changes of water, and then placed in the

Fixing Bath,

which consists of a one per cent. solution of ammonia in water.

COMBINED TONING AND FIXING BATHS.

Hyposulphite of soda	3 ounces.
Nitrate of lead	60 grains.
Chloride of gold	6 "
Water	24 ounces.

Gaedicke.

Hyposulphite of soda	200 grams.
Boric acid	30 "
Lead nitrate	15 "
Sulphocyanide of ammonium	20 "
Chloride of gold (1:200)	60 cc.
Water	1,000 "

Chloride of gold	1 grain.
Phosphate of sodium	15 "
Sulphocyanide of ammonium	25 "
Hyposulphite of sodium	240 "
Water	2 ounces.

Dissolve the gold separately in a small quantity of water, and add it to the other solution.

No-gold Combined Bath.

Hypo	6	ounces.
Washing soda	$\frac{1}{4}$	"
Lead acetate	$\frac{1}{2}$	"
Water	1	quart.

Toning Formulæ.

Chloride of gold	1	grain.
Acetate of sodium	30	"
Water	8	ounces.

This must not be used till one day after preparation. It keeps well, and gives warm, rich tones.

Chloride of gold	1	grain.
Bicarbonate of sodium	4	"
Water	8	ounces.

This is ready for immediate use after preparation, but it will not keep.

Chloride of gold	1	grain.
Phosphate of sodium	20	"
Water	8	ounces.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

Gold solution	10	drams.
Acetate of lime	20	grains.
Chloride of lime	1	"
Tepid water	20	ounces.

The "gold solution" before mentioned is prepared by neutralizing as much as is required of a one-grain solution of chloride of gold by shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces tepid water, which will prove sufficient to tone a full-sized sheet of paper.

Chloride of gold	15 grains.
Water	5 ounces.

Neutralize with lime water, make up to fifteen ounces with water, and add two drams of chloride of calcium. This stock solution will keep for a long time. For use, dilute one ounce with ten ounces of water.

Aristo-Platino Toning Bath.

Tone to a sepia color in a toning bath of water and chloride of gold, made neutral with borax. Wash twice and tone in

Potassium chloro-platinite	$2\frac{1}{2}$ grains.
Phosphoric acid, C. P.	$\frac{1}{2}$ dram.
Water	60 ounces.

MOUNTANT.

Best thin glue	3	ounces.
Golden syrup	$\frac{3}{4}$	"
Alcohol	3	"
Water	3	"

Soften the glue in 2 ounces of the water; heat gently in a pan of hot water, add the syrup (refined molasses), add the other ounce of water to the alcohol and pour into the jar under constant stirring.

For Coloring Photographs.

The finely powdered colors are mixed with the following:

Filtered albumen	100 cc.
Ammonium carbonate	5 grams.
Glycerine	3 cc.
Liquid ammonia	4 cc.
Water	25 cc.

Black for Woodwork.

Shellac	40	parts.
Borax	20	"
Glycerine	20	"
Water	500	"

After dissolving, add 50 parts aniline black.

For Writing on Glass.

Bleached shellac	2 parts.
Venice turpentine	1 "
Oil of turpentine	3 "
Lampblack	1 "

Warm the first three ingredients together over a water-bath, and then stir in the lampblack, incorporating thoroughly.

Flash Powders.

Powdered aluminum	21.7 parts by weight.
Antimony sulphide	13.8 " " "
Chlorate of potash	64.5 " " "

Powder separately and mix in a paper bag. Burns in one-seventeenth of a second.

Powdered aluminum	30 parts by weight.
Chlorate of potash	70 " " "

Burns in one-fifth of a second.

Le Roy's flash powder for orthochromatic work.

Magnesium powder	1 part.
Binoxide of barium	5 parts.

Retouching Varnish.

Sandarac	1 ounce.
Castor oil	80 grains.
Alcohol	6 ounces.

First dissolve the sandarac in the alcohol, and then add the oil.

Ground-Glass Varnish.

Sandarac	90 grains.
Mastic	20 "
Ether	2 ounces.
Benzole	½ to 1½ ounce.

The proportion of the benzole added determines the nature of the matt obtained.

A Substitute for Varnishing.

JENNEY.

Alum	2 ounces.
Tannic acid	1 dram.
Water	16 ounces.

Immerse for from three to five minutes; too long an immersion loosens the glass from the film; wash for fifteen minutes. The film so treated is almost water-proof.

As a varnish for celluloid films, the following is recommended in *Phot. Notizen:*

Powdered amber	5 parts.
Chloroform	45 "
Coal-tar benzine	45 "
Gum dammar	7½ "

The mixture should be allowed to stand in a warm place for some time and decanted twice before using.

SUMPNER'S TABLE,

showing the amount of light reflected from various substances, as compared with that which falls on their surfaces.

White blotting paper	82 per cent.
White cartridge paper	80 "
White tracing cloth	35 "
White tracing paper	22 "
Ordinary foolscap	70 "
Newspapers	50 to 70 "
Yellow wall paper	40 "
Blue paper	25 "
Dark brown paper	13 "
Dark chocolate paper	4 "
Planed deal, clean	40 to 50 "
Planed deal, dirty	20 "
Yellow painted wall, dirty	20 "

DEVELOPER FOR "CLIMAX" PROCESS PLATES.

The following formula is an old and well-tried one with these plates, and will be found to give, with properly exposed plates, negatives that are of such character as to be ready for use without intensification:

No. 1.

Sulphite of soda	4 ounces.
Pyro	1 ounce.
Sulphuric acid	15 drops.
Water	20 ounces.

No. 2.

Carbonate of soda (gran.)	4 ounces.
Water	20 "

In order to get density, a smaller proportion of alkali is used, and the mixture we have found to answer best for line negatives is No. 1, 1 ounce; No. 2, ½ ounce; water, 1½ ounces, and ¼ of a dram of a 12-grains-to-the-ounce solution of potassium bromide. The image should develop slowly, and should be under control. However, the plate will not fog under any circumstances in this developer.

After development, wash in water, and fix in the usual solution of hyposulphite of soda. If the developer is used repeatedly it will be found necessary to clear the plates with a mixture of hydrochloric acid, ½ ounce; water, 20 ounces. For half-tone work the prism is almost universally used, thus dispensing with the stripping of the film. The addition of the prism increases the exposure about ten to fifteen seconds, but, when one remembers that the stripping of the film is dispensed with, this is by no means an obstacle.

CARBUTT'S DEVELOPER FOR PROCESS PLATES.

Developing Formula for Half-Tone (Screen) and Negatives of Pen Drawings.

No. 1.

Neutral oxalate of potash	1 pound.
Warm water (free from lime salts)	48 ounces.

Add of a strong solution of citric acid enough to just turn litmus paper red.

No. 2.

Sulphate of iron	½ pound.
Sulphuric acid	15 drops.
Warm water	24 ounces.

No. 3—*Restrainer.*

Potassium bromide	½ ounce.
Water	10 ounces.

To develop, to 5 ounces No. 1 add 1 ounce No. 2 and 10 drops No. 3.

To get an even developed plate, use sufficient developer to well cover the plate, allow to act until, on looking through, the image appears quite dense; then wash and place in clearing bath one or two minutes.

No. 4—*Clearing Bath.*

Alum	1 ounce.
Citric acid	½ "
Water	20 ounces.

Again wash and immerse in fixing bath.

No. 5—*Fixing Bath.*

Sulphite of soda	2 ounces.
Water	6 "
Sulphuric acid	1 dram.
Water	2 drams.
Hyposulphite of soda	1 pound.
Water	48 ounces.
Chrome alum	1 ounce.
Water	8 ounces.

Dissolve in the order given, add the solution of sulphuric acid to the sulphite of soda, add this to the hyposulphite, and finally add the solution of chrome alum.

No. 6—*Reducing Solution.*

Ferricyanide of potassium	50 grains.
Water	10 ounces.

No. 7—*Bleaching Solution.*

No. 1.

Bichloride of mercury	240 grains.
Chloride of ammonium	240 "
Distilled water	20 ounces.

No. 2.

Chloride of ammonium	240 grains.
Water	20 ounces.

No. 8—*Cyanide Silver Solution.*

Cyanide of potassium, C. P.	60 grains.
Distilled water	6 ounces.
Nitrate of silver	60 grains.
Distilled water	2 ounces.

Pour the silver into the cyanide solution while stirring, and mark bottle "Poison."

COPYING COLLODION.

For Line Work.

Ether and alcohol, equal parts.

Anthony's snowy cotton	6 grains to 1 ounce.
Brown iodide of ammonium	4 " " "
Bromide of cadmium	1 " " "

FOR ETCHING ON STEEL.

Spencer Acid.

No. 1.

Nitric acid	5 ounces.
Water (distilled)	5 "
Pure metallic silver	1 "

No. 2.

Nitric acid, C. P.	5 ounces.
Water (distilled)	5 "
Quicksilver	1 "

The two solutions are made in separate vessels, and then mixed and kept in a glass-stoppered bottle. This mordant can be diluted with water, and thus the intensity of its action can be regulated. A strip of zinc, bent so as to touch a bared portion of the steel at one end and the Spencer acid at the other, is used to establish a galvanic action and start the action of the acid.

Photographic Societies.

UNITED STATES.

AGASSIZ ASSOCIATION, MANHATTAN CHAPTER.—Organized 1881. Incorporated 1886. Headquarters, 141 East 40th Street, New York. *President*, Christian F. Groth; *Vice-President*, Charles Kromm; *Treasurer*, W. S. Miller; *Secretary*, Edward B. Miller, 141 East 40th Street, New York.

AKRON CAMERA CLUB.—Organized 1890. Headquarters, Akron, Ohio. *President*, Prof. C. M. Dwight; *Treasurer*, Frank Adams; *Secretary*, Prof. W. D. Shipman, 231 South Union Street, Akron, Ohio.

ALBANY CAMERA CLUB.—Organized 1887. Headquarters, 29 Steuben Street, Albany, N. Y. *President*, W. W. Byington; *Vice-President*, Dayton Ball; *Treasurer*, Edward D. Mix; *Secretary*, Dr. Chas. E. Davis, 91½ Hudson Ave., Albany, N. Y.

AMATEUR PHOTOGRAPHIC ASSOCIATION.—Organized 1887. Headquarters, Selma, Dallas Co., Ala. *President*, William S. Monk; *Secretary* and *Treasurer*, S. Orlando Trippe, Selma, Ala.

AMERICAN INSTITUTE, N. Y. (Photographical Section).—Established 1859. Headquarters, Institute Rooms, 111-115 West 38th Street. Annual meeting, February. Meetings, first Tuesday in each month, excepting July and August. *President*, Henry J. Newton; *Vice-President*, Cornelius Van Brunt; *Treasurer*, Edward Schell; *Secretary*, Oscar G. Mason, Photographical Department, Bellevue Hospital, New York City.

AMERICAN LANTERN SLIDE INTERCHANGE.—Organized 1885. *Board of Managers*—F. C. Beach, 361 Broadway (Genl.); Harlow C. Boyce, Will H. Olmstead, Wm. H. Rau, Harry W. Smith.

AMERICAN LEAGUE OF AMATEUR PHOTOGRAPHERS.—Organized July 12, 1892. *President*, Oscar S. Teale; *Secretary*, R. M. Fuller, Cranford, N. J.

A. L. A. P. LANTERN SLIDE EXCHANGE.—*Committee*—Oscar S. Teale, Plainfield, N. J.; H. S. Fowler, J. T. Wilcox.

BETHLEHEM PHOTOGRAPHIC SOCIETY.—Organized January, 1894. Headquarters, Bethlehem, Pa. *President*, Dr. E. M. Hyde; *Vice-President*, H. S. Housekeeper; *Treasurer*, C. F. Smith; *Secretary*, F. E. Hammann, Bethlehem, Pa.

BOSTON CAMERA CLUB.—Organized October 7, 1881. Headquarters, 50 Bromfield Street, Boston, Mass. *President*, Geo. M. Morgan; *Vice-Presidents*, Wm. Sumner Briggs, J. Prince Loud, Chas. Sprague; *Treasurer*,

Owen A. Eames; *Librarian*, Albert E. Fowler; *Secretary*, Wilbur C. Brown, 50 Bromfield Street, Boston, Mass.

BRIDGETON CAMERA SOCIETY.—Organized January 27, 1890. Headquarters, 48-50 E. Commerce Street, Bridgeton, N. J. *President*, Henry A. Janvier; *Vice-President*, Geo. Hampton; *Treasurer*, Sydney E. Bowen; *Recording Secretary*, Oscar F. Anderson; *Corresponding Secretary*, Henry W. Scull, Cumberland National Bank, Bridgeton, N. J.

BROOKLYN ACADEMY OF PHOTOGRAPHY.—Incorporated February, 1887. Headquarters, 177 Montague Street, Brooklyn, N. Y. *President*, Jno. Merritt, M. D.; *Vice-Presidents*, F. Dana Reed, Starks W. Lewis; *Treasurer*, Wm. J. Wintringham; *Librarian*, Wm. Arnold; *Recording Secretary*, A. A. Goubert; *Corresponding Secretary*, Geo. L. Coit, 9 Garden Pl., Brooklyn, N. Y.

BROOKLYN INSTITUTE OF ARTS AND SCIENCE, Department of Photography– Became Special Department March 26, 1889.—Headquarters, 201 Montague Street, Brooklyn, N. Y. *President*, Wm. H. Cooper; *Vice-President*, Mrs. C. H. Burdette; *Curator*, Lewis E. Meeker, M. D.; *Secretary*, Gould W. Hart; *Corresponding Secretary*, J. W. Mitlard, 204 Cumberland Street, Brooklyn, N. Y.

BUFFALO CAMERA CLUB.—Organized October 10, 1888. Headquarters at Market Arcade, Main Street, Buffalo, N. Y. *President*, Geo. J. Bailey; *Vice-President*, O. H. Hauenstein; *Secretary* and *Treasurer*, Wm. J. Haskell, 445 Richmond Ave., Buffalo, N. Y.

CALIFORNIA CAMERA CLUB.—Incorporated April 5, 1890. Headquarters, Academy of Science Building, 819 Market Street, San Francisco, Cal. *President*, A. G. McFarland; *Vice-Presidents*, A. A. Martin, H. C. Tibbetts; *Treasurer*, E. G. Eisen; *Librarian*, H. C. Owens; *Secretary*, C. F. Cormack, 2508 Folsom Street, San Francisco, Cal.

CAMERA CLUB OF CAPITOL BICYCLE CLUB.—Organized October, 1891. Headquarters, 409 15th Street N. W., Washington, D. C. *President*, Howard Gray Douglas; *Secretary* and *Treasurer*, Alfred J. Henry, Weather Bureau, Washington, D. C.

CAMERA CLUB OF MOUNT VERNON.—Established 1895. Headquarters, Studio of W. F. Sleight, Fourth Ave., Mt. Vernon, N. Y. *President*, B. H. Carmer; *Vice-President*, Edgar Henriques; *Treasurer*, J. A. Young; *Secretary*, Miss Mary E. Jennings; *Librarian*, A. J. Cunningham.

CAMERA CLUB OF NEWARK, DEL.—Established April, 1892. Headquarters, Newark, Del. *President*, Prof. F. D. Chester; *Vice-President*, F. W. Curtis; *Secretary* and *Treasurer*, Prof. W. H. Bishop, Newark, Del.

CAMERA CLUB OF THE UNIVERSITY OF NEBRASKA.—Established January, 1892. Headquarters, Chemical Laboratory of University of Nebraska, Cor. 12th and R Sts., Lincoln, Neb. *President*, R. S. Hillner; *Vice-President*, E. C. Hardy; *Secretary* and *Treasurer*, Miss Rosa Bouton, 1436 S Street, Lincoln, Neb.

CAMERA CLUB OF THE UNIVERSITY OF PENNSYLVANIA.—Established March, 1889. Headquarters at the College Hall, University of

Pennsylvania, 36th Street and Woodland Ave., Philadelphia, Pa. *President*, Geo. D. Codman; *Treasurer*, Geo. B. Bains; *Secretary*, Chas. R. Hinchman, 3655 Chestnut Street, Philadelphia, Pa.

"CAMERADS."—Established 1886. Headquarters, Rutgers College, New Brunswick, N. J. *President*, Prof. Peter T. Austin; *Vice-President*, Wm. D. Horn; *Treasurer*, Chas. V. Myers; *Secretary*, Dr. Harvey Iredell, L. Box 34, New Brunswick, N. J.

CAPITAL CAMERA CLUB.—Organized May, 1891. Headquarters, 401 7th Street N. W., Washington, D. C. *President*, Jose M. Yznaga; *Vice-President*, Eugene Lee Ferguson; *Treasurer*, Chas. L. DuBois; *Secretary*, Frank B. Dante, 1305 T Street N. W., Washington, D. C.

CENTRAL CAMERA CLUB, BROOKLYN Y. M. C. A.—Established 1888. Headquarters, "Studio," 502 Fulton Street, Brooklyn, N. Y. *President*, Wm. H. Lowery; *Vice-President*, F. F. Braillard, Jr.; *Treasurer*, E. A. Crowell; *Secretary*, B. A. Burger, 160 Atlantic Street, Brooklyn, N. Y.

CHAUTAUQUA PHOTOGRAPHIC EXCHANGE CLUB.—Organized August, 1888. *President*, Henry E. Canfield; *Assistant Secretary*, Gould W. Hart; *Secretary* and *Treasurer*, Miss C. L. Pierce, Elmhurst, Riverside, Conn.

CHICAGO CAMERA CLUB.—Established 1889. Headquarters, 182-184 Wabash Ave., Chicago, Ill. *President*, Rev. M. L. Williston; *Vice-President*, Dr. M. R. Brown; *Treasurer*, Edw. J. Fowler; *Secretary*, W. W. Abbott, 182 Wabash Ave., Chicago, Ill.

CHICAGO SOCIETY OF AMATEUR PHOTOGRAPHERS.—Organized 1886; reorganized October, 1894. Headquarters, 4 E. Monroe Street, Chicago, Ill. *President*, Walter A. Morse; *Treasurer*, Marshall Waite; *Secretary*, F. F. Gaylord, 597 Cleveland Ave., Chicago, Ill.

CINCINNATI SCHOOL OF PHOTOGRAPHY.—Established 1895. Headquarters, Brenner's Studio, 156 W. 4th Street, Cincinnati, Ohio. Communications to be addressed to D. K. Cady, Cincinnati, Ohio.

CINCINNATI SOCIETY OF NATURAL HISTORY—(Photographic Section).—Established January 24, 1884. Headquarters, 108 Broadway, Cincinnati, Ohio. *President*, H. J. Buntin; *Vice-President*, T. H. Kelly; *Treasurer*, F. M. Coppock; *Librarian*, Dr. A. I. Carson; *Recording Secretary*, Jno. McKay; *Corresponding Secretary*, W. A. McCord, Carew Building, Cincinnati, Ohio.

CLEVELAND CAMERA CLUB.—Established January 25, 1887. Headquarters, 5 Euclid Ave., Cleveland, Ohio. *President*, Frank Dorn; *Vice-President*, Alfred Ogler; *Treasurer*, Wm. Dorn; *Secretary*, Dr. R. Dayton, 1202 Wilson Ave., Cleveland, Ohio.

COLORADO CAMERA CLUB.—Organized January, 1892. Headquarters, Williamson Blk., 16th Street, Denver, Col. *President*, W. H. Jackson; *Vice-President*, F. W. Hart; *Secretary*, E. L. Kern; *Corresponding Secretary*, Harry D. Smith, 523-525 16th Street, Denver, Col.

COLUMBIA CAMERA CLUB OF ASTORIA.—Organized November 22, 1893. Headquarters at Astoria, Ore. Member of Lantern Slide Interchange. *President,* W. A. Sherman; *Vice-President,* W. A. Sherman; *Secretary,* W. Timson, 598 Commercial Street, Astoria, Ore.; *Treasurer,* G. W. Lounsberry.

COLUMBIA PHOTOGRAPHIC SOCIETY.—Incorporated 1893. Headquarters, 1807 Columbia Ave., Philadelphia, Pa. *President,* G. J. R. Miller; *Vice-President,* W. P. Buchanan; *Secretary* and *Treasurer,* Jno. N. Reeve, 203 Walnut Street, Room 4, Philadelphia, Pa.

COLUMBIAN AMATEUR PHOTOGRAPHIC EXCHANGE.—Established March 1, 1893. *President,* J. T. Harden; *Secretary,* A. H. Waite, Tacoma, Wash.

COLUMBUS CAMERA CLUB.—Established October 6, 1884. Incorporated February, 1890. Headquarters, Y. M. C. A. Bldg., Columbus, Ohio. *President,* Jno. Field; *Vice-President,* C. H. Doty; *Treasurer,* C. S. Bradley; *Librarian,* Miss Hester C. Getz; *Secretary,* W. B. Kimball, 32 E. Spring Street, Columbus, Ohio.

CORTLAND CAMERA CLUB.—Organized 1895. Headquarters, Cortland, N. Y. *President,* Dr. Frank W. Higgins; *Vice-President,* Jas. G. Jarvis; *Secretary* and *Treasurer,* H. M. Alexander, 17 Clayton Street, Cortland, N. Y.

DELAWARE CAMERA CLUB.—Established 1891. Headquarters, Equitable Building, Wilmington, Del. *President,* Jno. M. Rogers; *Vice-Presidents,* Miss Rachel S. Howland, Geo. A. Elliott; *Treasurer,* Caleb M. Sheward; *Recording Secretary,* Willard C. Jackson; *Corresponding Secretary,* Jno. C. Phillips, 803 Franklin Street, Wilmington, Del.

DETROIT LANTERN CLUB.—Established January 6, 1891. Headquarters, Museum of Art, Hastings Street and Jefferson Ave., Detroit, Mich. *President,* F. E. Kirby; *Director,* A. D. Noble, Jr.; *Secretary* and *Treasurer,* D. Farrand Henry, 52 Woodward Ave., Detroit, Mich.

ELIZABETH CAMERA CLUB.—Organized 1893; incorporated 1894. Headquarters, 96 Broad Street, Elizabeth, N. J. *President,* D. R. Blackford; *Vice-President,* E. M. Estabrook; *Treasurer,* Jas. A. Woodward; *Secretary,* N. C. Darby, 315 N. Broad Street, Elizabeth, N. J.

FRANKFORD CAMERA CLUB.—Established October, 1889. Headquarters, Wright's Industrial and Beneficial Inst., Frankford, Phila., Pa. *President,* J. Howard Morrison; *Vice-President,* Richd. B. Watmough; *Treasurer,* J. Howard Horrocks; *Secretary,* J. M. Justice, A. M., 5016 Penn Ave., Frankford, Phila., Pa.

HARVARD CAMERA CLUB.—Formed in 1889. Headquarters, Harvard University, Cambridge, Mass. *President,* P. P. Sharples; *Vice-President,* C. P. M. Rumford; *Secretary* and *Treasurer,* Haven Emerson, Thayer, 63, Cambridge, Mass.

HOBOKEN CAMERA CLUB.—Established March 22, 1889. Headquarters, Camera Building, 1036 Park Ave., Hoboken, N. J. *President,* A. J. Thomas; *Vice-President,* C. Sudhaus; *House Committee,* F. A. Muench

(chairman); *Treasurer*, H. J. Kaltenbach; *Secretary*, A. L. Smith, 1045 Bloomfield Street, Hoboken, N. J.

ILLINOIS COLLEGE OF PHOTOGRAPHY.—Established 1895. Headquarters, Effingham, Ill. *Directors*—L. H. Bissell, Dr. Henry Eversman, Benson Wood, M. C.; Mrs. N. B. White, Judge S. F. Gilmore, Judge W. B. White, Dr. W. B. Dennis, Sr., Hon. H. B. Kepley.

INTERNATIONAL PHOTO PRINT EXCHANGE.—Formed May, 1893. *Secretary*, Walter Sprange, Beach Bluff, Mass. September to December 1, Church Court, Clements Lane, London, E. C., England.

IRVINGTON ART AND CAMERA CLUB.—Organized 1892. Headquarters, Springfield and Union Aves., Irvington, N. J. *President*, E. D. Harrison; *Vice-President*, Frank H. Morrill; *Treasurer*, James Peckwell, Jr.; *Secretary*, Milton C. Tompkins, Irvington, N. J.

LAWRENCE CAMERA CLUB.—Established 1893. Headquarters, Brechin Block, Lawrence, Mass. *President*, John Lord; *Vice-Presidents*, Caleb Saunders and J. H. Greer; *Treasurer*, Carl H. Graf; *Secretary*, Richard A. Hale, Lawrence, Mass.; *Librarian*, Miss Carrie J. Pingree.

LOUISVILLE CAMERA CLUB.—Organized April 24, 1888. Headquarters, N. E. Cor. 4th Ave. and Jefferson Street, Louisville, Ky. *President*, Prof. E. H. Marks; *Vice-President*, Pierce Butler; *Secretary* and *Treasurer*, R. L. Stevens, 1100 W. Main Street, Louisville, Ky.

LOWELL CAMERA CLUB.—Established 1889. Incorporated 1892. Headquarters in Central Block, Lowell, Mass. *President*, Paul Butler; *Vice-Presidents*, W. P. Atwood and F. T. Walsh; *Treasurer*, M. A. Taylor; *Secretary*, George A. Nelson, 91 Mansur Street, Lowell, Mass.; *Librarian*, A. H. Sanborn.

LYNN CAMERA CLUB.—Established January 1, 1888. Incorporated December 20, 1889. Headquarters, 42 Broad Street, Lynn, Mass. Chas. A. Lawrence (*ex-Secretary*), 13 Item Building, Lynn, Mass.

MANUAL TRAINING SCHOOL CAMERA CLUB—Dept. of Science.—Headquarters, Manual Training School, Court and Livingston Sts., Brooklyn, N. Y. *President*, H. J. Wells; *Vice-President*, D. S. Whitlock; *Treasurer*, W. D. Gray; *Secretary*, Ira J. Ackerman, Manual Training School, Brooklyn, N. Y.

MATTAPAN CAMERA CLUB.—Organized May, 1890. Headquarters, Mattapan, Mass. *President*, Jno. A. Locklin; *Treasurer*, Alfred L. Karcher; *Lecturer*, Henry N. Locklin; *Secretary*, Erdmann Sonnebrodt, P. O. box 83, Mattapan, Mass.

MELROSE CLUB.—Headquarters, Melrose, Mass. Wm. R. Lavender, Melrose, Mass., *Chairman Exhibition Committee.*

MEMPHIS CAMERA CLUB.—Organized 1893. Headquarters, Y. M. C. A. Rooms, 38 Madison Street, Memphis, Tenn. *President*, A. Wardle; *Vice-President*, Gen. Jas. B. Heiskill; *Secretary* and *Treasurer*, Geo. O. Friedel, 165 Gayoso Street, Memphis, Tenn.

MIDDLETOWN SCIENTIFIC ASSOCIATION.—*Secretary*, Chas. D. Wood, Middletown, Conn.

MINNEAPOLIS CAMERA CLUB.—Incorporated 1892. Headquarters, American Terrace, 13-15 North Fourth Street, Minneapolis, Minn. *President*, A. L. Eidemiller; *Vice-President*, W. H. McMullen; *Treasurer*, A. S. Williams; *Secretary*, C. J. Hibbard, 10 South Fourth Street, Minneapolis, Minn.

MYSTIC CAMERA CLUB.—Established June 14, 1889. Incorporated March 17, 1891. Headquarters, 28 Main Street, Medford, Mass. *President*, J. F. Wade; *Vice-President*, C. A. Clark; *Treasurer*, J. B. Thaxter, Jr.; *Secretary*, W. M. Archibald, 8 South Street, Medford, Mass.

NATIONAL CAMERA CLUB.—Established 1895. Headquarters, 1207 F Street N. W., Washington, D. C. *President*, Jno. L. Waggaman; *Vice-President*, W. S. McLeod; *Secretary* and *Treasurer*, B. M. Clindeinst, Jr., 1207 F Street N. W., Washington, D. C.

NATURAL SCIENCE CAMP—(Photographic Department).—Organized 1890. Headquarters, Natural Science Camp, Canandaigua Lake, N. Y. *Director*, Albert L. Arey, Rochester, N. Y.

NEWARK CAMERA CLUB.—Organized April 18, 1888. Headquarters, 224-226 Market Street, Newark, N. J. *President*, J. M. Foote; *Vice-President*, Wm. Archibald; *Treasurer*, H. W. Smith; *Secretary*, David S. Plumb, 24 Boudinot Street, Newark, N. J.

NEW BRITAIN CAMERA CLUB.—Established February, 1892. Headquarters, New Britain, Conn. *President*, R. S. Brown; *Vice-President*, E. T. Porter; *Secretary* and *Treasurer*, F. W. Wood, 273 Main Street, New Britain, Conn.

NEW ENGLAND LANTERN SLIDE EXCHANGE.—*Secretary*, Will C. Eddy, 3 Grove Street, Medford, Mass.

NEW ORLEANS CAMERA CLUB.—Organized December 17, 1886. Incorporated May 3, 1888. Headquarters, 12 Union Street, New Orleans, La. *President*, Hon. B. C. Shields; *Vice-President*, W. Gowland; *Treasurer*, Wm. Grimshaw; *Secretary*, M. V. Haulard, 1729 Bienville Ave., New Orleans, La.

NEWTON CAMERA CLUB.—Established 1893. Incorporated 1894. Headquarters, Club-house, Brookside Ave., Newtonville, Mass. *President*, F. O. Stanley; *Vice-President*, Dr. E. B. Hitchcock; *Treasurer*, F. W. Sprague, Jr.; *Secretary*, T. M. Clark.

NEW YORK CAMERA CLUB.—Incorporated 1888. 314 5th Ave., New York City. *President*, Saml. W. Bridgman; *Vice-President*, Franklin Harper; *Treasurer*, Robt. J. Devlin; *Librarian*, Geo. Trowbridge; *Secretary*, Chas. W. Stevens, M. D., 33 W. 33d Street, New York City.

OLD COLONY CAMERA CLUB.—Headquarters, Smith Block, Rockland, Mass. *President* and *Secretary*, David Smith, Rockland, Mass; *Vice-President* and *Treasurer*, Emery H. Jenkins.

OMAHA CAMERA CLUB.—Established February, 1894. Headquarters, 1312 Farnam Street, Omaha, Neb. *President*, Chas. E. Sumner; *Vice-Presidents*, A. S. Billings, L. R. Sharp; *Treasurer*, E. C. Brownlee; *Secretary*, W. Durnall, 462 S. 24th Street, Omaha, Neb.

ONEIDA CAMERA CLUB.—Established March, 1894. Headquarters, P. O. Block, Oneida, N. Y. *President*, B. S. Teale; *Vice-President*, Geo. R. Hanson; *Treasurer*, Albert Dygert; *Secretary*, E. R. McDougall, Oneida, N. Y.

ORANGE CAMERA CLUB.—Organized 1892. Headquarters, 220 Main Street, Orange, N. J. *President*, Wm. H. Cheney; *Vice-President*, Edw. H. Graves; *Treasurer*, Chas. A. Lindsley; *Secretary*, Alfred C. Bode, 359 Main Street, Orange, N. J.

OREGON CAMERA CLUB.—Organized January, 1895. Headquarters, 127½ 1st Street, Portland, Ore. *President*, A. Anderson; *Vice-President*, Dr. Frank E. Ferris; *Treasurer*, W. H. Chapin; *Secretary*, J. A. Hertzman, P. O. Box 936, Portland, Ore.

PATERSON CAMERA CLUB.—Organized 1893. Headquarters, 9 Lake Street, Paterson, N. J. *President*, C. M. Giles; *Vice-President*, H. W. Gledhill; *Treasurer*, Wm. M. Moore; *Librarian*, F. B. Hoagland; *Secretary*, Chas. D. Cooke, Paterson, N. J.

PHOTOGRAPHERS' ASSOCIATION OF AMERICA.—Meeting in 1896 will be held at Chautauqua. *President*, R. P. Bellsmith; *First Vice-President*, Geo. Steckel; *Second Vice-President*, W. H. Root; *Treasurer*, C. M. Hayes; *Secretary*, J. Will Kelmer, Hazleton, Pa.

PHOTOGRAPHERS' ASSOCIATION OF IOWA.

PHOTOGRAPHERS' ASSOCIATION OF KANSAS.—*President*, P. A. Miller; *First Vice-President*, A. McInturff; *Second Vice-President*, H. S. Stevenson; *Treasurer*, C. Sawyer; *Secretary*, G. M. Sandifer, El Dorado, Kan.

PHOTOGRAPHERS' ASSOCIATION OF MISSOURI.

PHOTOGRAPHERS' ASSOCIATION OF OHIO.—Meeting in 1896 will be held at Columbus. *President*, L. C. Overpeck; *First Vice-President*, Brigden; *Second Vice-President*, Mulligan; *Treasurer*, Hollinger; *Secretary*, Geo. B. Sperry.

PHOTOGRAPHIC CLUB OF BALTIMORE.—Organized May, 1891. Headquarters, Madison and Eutaw Sts., Baltimore, Md. *President*, A. S. Murray; *Vice-President*, Dr. Frank Slothower; *Treasurer*, E. M. Barker; *Secretary*, Chas. E. Needles, 404 Cathedral Street, Baltimore, Md.

PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.—Established 1862. Headquarters, 10 South 18th Street, Philadelphia, Pa. Publishes the "Journal of the Photographic Society of Philadelphia." *President*, Joseph H. Burroughs; *Vice-Presidents*, Charles R. Pancoast and Robert S. Redfield; *Treaurer*, George Vaux, Jr.; *Secretary*, Edmund Stirling, "Public Ledger," Philadelphia, Pa.

PHOTOGRAPHIC SOCIETY OF WATERBURY.—Organized May, 1888. Headquarters, Brown's Bl., S. Main Street, Waterbury, Conn. *President*, H. T. Stedman; *Vice-President*, Leroy S. White; *Treasurer*, Wm. M. Hodges; *Financial Secretary*, Frank Welton; *Recording Secretary*, Geo. H. Ward, 14 Division Street, Waterbury, Conn.

PITTSBURGH AMATEUR PHOTOGRAPHERS' ASSOCIATION.—Organized 1886. Headquarters, Academy of Art and Science, Pittsburgh, Pa. *President*, W. S. Bell; *Vice-President*, W. S. Clow; *Treasurer*, W. J. Hunker; *Librarian*, Geo. D. Heisley; *Secretary*, Jas. H. Hunter, 248 Center Ave., Pittsburgh, Pa.

PITTSFIELD CAMERA CLUB.—Established February, 1892. Headquarters, Pittsfield, Mass. *President*, C. G. Tompkins; *Vice-President*, Robt. B. Johnson; *Treasurer*, Allan H. Bagg; *Secretary*, J. E. Colton, Pittsfield, Mass.

PLAINFIELD CAMERA CLUB.—Organized 1889. Incorporated 1890. Headquarters, Babcock Building, W. Front Street., Plainfield, N. J. *President*, Oscar S. Teale; *Vice-President*, Howard Y. Stillman; *Treasurer*, W. H. Freeman; *Historian*, F. R. Stevens; *Secretary*, H. H. Coward, 245 E. Front Street, Plainfield, N. J.

PORTLAND CAMERA CLUB.—Organized February 6, 1890. Headquarters, Society of Art Building, Deering Pl., Portland, Maine. *President*, S. P. Warren, M. D.; *Vice-President*, Nathan Clifford; *Treasurer*, C. T. Whipple; *Secretary*, Fredk. Fox, Jr., 77 State Street, Portland, Maine.

POSTAL PHOTOGRAPHIC CLUB.—Organized December, 1888. *President*, Prof. Randal; *Secretary*, F. E. Fairbanks, 11 Day Street, Fitchburg, Mass.

PUTNAM CAMERA CLUB.—Established January, 1888. Headquarters, Putnam, Conn. *President*, Geo. E. Dresser; *Treasurer*, Edw. F. Whitmore; *Secretary*, Eric H. Johnson, Putnam, Conn.

PROVIDENCE CAMERA CLUB.—Established 1883. Headquarters, 87 Weybosset Street, Providence, R. I. *President*, R. Clinton Fuller; *Vice-President*, W. P. Mather; *Treasurer*, Edmund A. Darling; *Recording Secretary*, F. P. Wilbur; *Corresponding Secretary*, J. Eliot Davison, 112 Cross Street, Central Falls, R. I.; *Librarian*, Geo. F. Curtis.

SAN DIEGO CAMERA CLUB.—Organized July, 1893. Headquarters, D Street, bet. 4th and 5th Sts., San Diego, Cal. *President*, Jos. Rodes, M. D.; *Vice-President*, Chas. Wellborn; *Treasurer*, Miss Laura B. Anderson; *Secretary*, W. W. Whitson, 1934 4th Street, San Diego, Cal.

SCHUYLKILL CAMERA CLUB.—Established July 5, 1889. Headquarters, Sheafer Office Building, S. Centre Street, Pottsville, Pa. *President*, A. W. Sheafer; *Vice-President*, Miss Elena Roads; *Treasurer*, W. L. Sheafer; *Secretary*, Prof. B. S. Simonds, 500 Mauch Chunk Street, Pottsville, Pa.; *Assistant Secretary*, R. Y. Patterson.

SEATTLE CAMERA CLUB.—Organized January, 1895. Headquarters,

Seattle, Wash. *President*, Dr. F. A. Churchill; *Vice-President*, Orion O. Denny; *Treasurer*, C. W. Parker; *Secretary*, Emil de Neuf, Seattle, Wash.

SOCIETY OF AMATEUR PHOTOGRAPHERS OF N. Y.—Organized March, 1884. Headquarters, 111-113-115 W. 38th Street, New York City. *President*, C. C. Roumage; *Vice-President*, Dr. Jas. H. Stebbins; *Treasurer*, W. E. Johnson; *Recording Secretary*, R. L. Bracklow; *Corresponding Secretary*, T. J. Burton, 113 W. 38th Street, New York City.

SPRINGFIELD CAMERA CLUB.—Organized 1886. Headquarters, Cor. Main and Dwight Sts., Springfield, Mass. *President*, Henry C. Haile; *Treasurer*, Wm. M. Lester; *Secretary*, Chas. C. McElwain, 43 Federal St., Springfield, Mass.

STEVENS PHOTOGRAPHIC SOCIETY.—Organized 1888. Headquarters, Stevens Institute of Technology, Hoboken, N. J. *President*, R. E. Hall; *Vice-President*, E. N. Wood; *Treasurer*, H. S. L. Verley; *Secretary*, M. H. Maxfield, 95 Stevens Institute, Hoboken, N. J.

ST. LOUIS CAMERA CLUB.—Organized 1885. Incorporated 1889. Headquarters, Pastime Club-house, 911 N. Vanderenter Ave., St. Louis, Mo. *President*, Walter H. Wilcox; *Vice-President*, Milton T. Corwin; *Chairman Lantern Slide Committee*, Chas. M. Alexander; *Secretary* and *Treasurer*, Henry B. Alexander, 4028 Westminster Pl., St. Louis, Mo.

ST. PAUL CAMERA CLUB.—Organized March 6, 1893. Headquarters, St. Paul, Minn. *President*, James Paris; *Vice-President*, D. T. Brown; *Treasurer*, W. B. Thorne; *Secretary*, W. J. Sonnen, St. Paul F. and M. Ins. Co., St. Paul, Minn.

SUNNY SIDE CAMERA CLUB.—Organized October, 1891. Headquarters, 5900 S. Broadway, St. Louis, Mo. *President*, Judge B. W. Blumenthal; *Secretary* and *Treasurer*, Prof. Wm. A. Bricner, 1235 S. Broadway, St. Louis, Mo.

SYRACUSE CAMERA CLUB.—Organized 1886. Incorporated 1892. Headquarters, 322 S. Salina Street, Syracuse, N. Y. *President*, Will H. Olmstead; *Vice-President*, Geo. Timmins; *Treasurer*, Jno. D. Pennock; *Secretary*, H. F. Smith, 1316 Spring Street, Syracuse, N. Y.

"TECH" CAMERA CLUB.—Established September, 1889. Headquarters, Boynton Hall, Polytechnic Inst., Worcester, Mass. *President*, H. J. Fuller; *Vice-President*, A. J. Smith; *Secretary* and *Treasurer*, J. W. Higgins, Polytechnic Inst., Worcester, Mass.

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TABLES.

TABLE OF THE ELEMENTS:

THEIR SYMBOLS, ATOMIC WEIGHTS, AND EQUIVALENTS.

	Symbol.	Atomic Weight.	Equivalent.		Symbol.	Atomic Weight.	Equivalent.
Aluminium	Al	27.02	9.007	Mercury	Hg	199.8	99.9
Antimony	Sb	120.	40.	Molybdenum	Mo	95.8	19.16
Arsenic	As	74.9	24.97	Nickel	Ni	58.6	29.3
Barium	Ba	136.8	68.4	Niobium	Nb	94.	31.33
Beryllium	Be	9.08	4.54	Nitrogen	N	14.01	4.67
Bismuth	Bi	208.	69.33	Osmium	Os	193.	24.125
Boron	B	10.9	3.66	Oxygen	O	15.96	7.98
Bromine	Br	79.75	79.75	Palladium	Pd	106.2	26.55
Cadmium	Cd	112.	56.	Phosphorus	P	30.96	10.32
Cæsium	Cs	133.	132.7	Platinum	Pt	194.3	48.575
Calcium	Ca	39.9	19.95	Potassium	K	39.04	39.04
Carbon	C	11.97	2.99	Rhodium	Ro	104.	26.
Cerium	Ce	139.9	46.6	Rubidium	Rb	85.2	85.2
Chlorine	Cl	35.37	35.37	Ruthenium	Ru	104.4	26.1
Chromium	Cr	52.4	26.2	Selenium	Se	78.8	39.4
Cobalt	Co	59.	29.5	Silicon	Si	28.3	7.
Copper	Cu	63.2	31.6	Silver	Ag	107.66	107.66
Didymium	Di	143.0	47.8	Sodium	Na	23.	23.
Erbium	E	165.9	55.3	Strontium	Sr	87.3	43.65
Fluorine	F	19.1	19.1	Sulphur	S	31.98	15.99
Gallium	Ga	69.	23.	Tantalum	Ta	182.	60.67
Gold	Au	197.	65.66	Tellurium	Te	125.	62.5
Hydrogen	H	1.	1.	Thallium	Tl	203.64	203.64
Indium	In	113.4	37.8	Thorium	Th	231.87	57.97
Iodine	I	126.53	126.53	Tin	Sn	117.8	58.9
Iridium	Ir	192.5	48.125	Titanium	Ti	48.0	12.
Iron	Fe	55.9	27.95	Tungsten	W	183.6	30.6
Lanthanum	La	138.5	46.17	Uranium	U	240.	60.
Lead	Pb	206.4	103.2	Vanadium	V	51.2	17.07
Lithium	Li	7.01	7.01	Yttrium	Y	89.6	29.87
Magnesium	Mg	24.	12.	Zinc	Zn	65.2	32.6
Manganese	Mn	55.	27.5	Zirconium	Zr	90.	45.

NOTE.—The equivalent numbers are the smallest quantities of the elements that unite with one part of hydrogen, eight parts of oxygen, or thirty-five parts of chlorine.

SOLUBILITY OF CHLORIDE OF SILVER IN SOLUTIONS OF VARIOUS SALTS.

(*H. Hahn.*)

	Per Cent. of the Solution.	Saturated at	Per Cent. of Silver Chloride Dissolved.	Per Cent. of Silver.	Sp. Gr.	Temperature.	Number of Grams of Silver in 100 c. c.
Potassium chloride	24.95	19.6°	0.0776	0.0584	1.1774	19.6°	0.0688
Sodium "	25.96	"	0.1053	0.0793	1.2053	"	0.0956
Ammonium "	28.45	24.5°	0.3397	0.2551	1.0835	30.0°	0.2764
Calcium "	41.26	"	0.5713	4.4300	1.4612	"	0.6283
Magnesium "	36.35	"	0.5313	0.3999	1.3350	"	0.5339
Barium "	27.32	"	0.0570	0.0429	1.3017	"	0.0558
Ferrous "	30.70	—	0.1686	0.1269	1.4199	20.0°	0.1802
Ferric "	37.48	—	0.0058	0.0044	1.4472	21.4°	0.0064
Manganous "	43.85	24.5°	0.1996	0.1499	1.4851	30.0°	0.2226
Zinc "	53.34	—	0.0134	0.0101	1.6005	"	0.0162
Cuprous "	44.48	24.5°	0.0532	0.0399	1.5726	"	0.0627
Lead "	0.99	"	0.0000	0.0000	1.0094	"	0.0000

SOLUBILITY OF SILVER CHLORIDE IN SOLUTIONS OF SODIUM SULPHITE OF VARIOUS DEGREES OF CONCENTRATION.

(*W. de W. Abney.*)

Strength of Sodium Sulphite Solution.	Grams of Silver Chloride Dissolved per 100 c. c.
1.04 grams per 100 c. c. of water.	0.007
2.08 " " " "	0.020
4.16 " " " "	0.070
6.24 " " " "	0.110
8.35 " " " "	0.150
16.70 " " " "	0.310
20.83 " " " "	0.400

SOLUBILITY OF SILVER CHLORIDE IN SOLUTIONS OF SODIUM THIOSULPHATE OF VARIOUS DEGREES OF CONCENTRATION.

(*W. de W. Abney.*)

Strength of Sodium Thiosulphate Solution.	Grams of Silver Chloride Dissolved per 100 c. c.
2.08 grams per 100 c. c. of water.	0.29
4.16 " " " "	0.64
6.24 " " " "	0.88
8.35 " " " "	1.26
16.70 " " " "	2.54
20.83 " " " "	3.28

DENSITIES OF WATER SOLUTIONS OF ALBUMEN AT 15.5° CELSIUS.

(*Eder's Year Book of Photography.*)

Per Cent. Albumen.	° Bé.	Sp. Gr.	Per Cent. Albumen.	° Bé.	Sp. Gr.	Per Cent. Albumen.	° Bé.	Sp. Gr.
1	0.37	1.0026	15	5.32	1.0384	40	13.78	1.1058
2	0.77	1.0054	20	7.06	1 0515	45	15.48	1.1204
3	1.12	1.0078	25	8.72	1.0644	50	17.16	1.1352
5	1.85	1.0130	30	10.42	1.0780	55	18.90	1.1511
10	3.66	1.0261	35	12.12	1.0919			

DENSITIES OF VARIOUS MIXTURES OF ALCOHOL AND ETHER AT 15° CELSIUS.

(*Eder's Year Book of Photography.*)

Per Cent. Alcohol 0.809 Sp. Gr.	Sp. Gr.	Per Cent. Alcohol 0.809 Sp. Gr.	Sp. Gr.
0	0 729	60	0.779
10	0.737	70	0.786
20	0.747	80	0.798
30	0.756	90	0.801
40	0.765	100	0.809
50	0.772		

DENSITIES OF WATER SOLUTIONS OF CUPRIC CHLORIDE AT 17.5° CELSIUS.

(*Franz.*)

Sp. Gr.	Per Cent. $Cu\ Cl_2$.	Sp. Gr.	Per Cent. $Cu\ Cl_2$.	Sp. Gr.	Per. Cent. $Cu\ Cl_2$.
1.0182	2	1.1696	16	1.3618	30
1.0364	4	1.1958	18	1.3950	32
1.0548	6	1.2223	20	1.4287	34
1.0734	8	1.2501	22	1.4615	36
1.0920	10	1.2779	24	1.4949	38
1.0178	12	1.3058	26	1.5284	40
1.1436	14	1.3338	28		

DENSITIES OF WATER SOLUTIONS OF FERRIC CHLORIDE AT 17.5° CELSIUS.

(*Franz.*)

Sp. Gr.	Per Cent. $Fe_2 Cl_6$.	Sp. Gr.	Per Cent. $Fe_2 Cl_6$.	Sp. Gr.	Per Cent. $Fe_2 Cl_6$.
1.0146	2	1.1746	22	1.3870	42
1.0292	4	1.1950	24	1.4118	44
1.0439	6	1.2155	26	1.4367	46
1.0587	8	1.2365	28	1.4617	48
1.0734	10	1.2568	30	1.4867	50
1.0894	12	1.2778	32	1.5153	52
1.1054	14	1.2988	34	1.5439	54
1.1215	16	1.3199	36	1.5729	56
1.1378	18	1.3411	38	1.6023	58
1.1542	20	1.3622	40	1.6317	60

DENSITIES OF WATER SOLUTIONS OF SILVER NITRATE AT 16° CELSIUS.

(*Dawson.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.
4	2.7	1.021	2.08	19	12.4	1.097	10.41	34	20.9	1.172	18.75
8	5.4	1.040	4.16	23	14.9	1.116	12.50	38	23.0	1.191	20.83
12	8.0	1.059	6.24	27	17.1	1.135	14.58	42	25.0	1.209	22.91
16	10.6	1.078	8.35	30	18.8	1.152	16.66	45	26.4	1.227	25.00

DENSITIES OF WATER SOLUTIONS OF CHROME ALUM.

(*Franz.*)

Sp. Gr.	Per Cent.	Sp. Gr.	Per Cent.
1.0174	5	1.1896	40
1.0342	10	1.2894	50
1.0746	20	1.4566	60
1.1274	30	1.6362	70

DENSITIES OF WATER SOLUTIONS OF POTASH OR AMMONIA ALUM AT 17.5° CELSIUS.

(*Eder's Year Book of Photography.*)

Sp. Gr. of $K_2Al_2(SO_4)_4+24Aq.$ Solution.	Sp. Gr. of $(NH_4)_2Al_2(SO_4)_4+24Aq.$ Solution.	Per Cent.
1.0065	1.0060	1
1.0110	1.0109	2
1.0166	1.0156	3
1.0218	1.0200	4
1.0269	1.0255	5
1.0320	1.0305	6

DENSITIES OF WATER SOLUTIONS OF SULPHUROUS ACID AT 15° CELSIUS.

(*Scott.*)

Sp. Gr.	Per Cent. SO_2.	Sp. Gr.	Per Cent. SO_2.
1.0028	0.5	1.0302	5.5
1.0056	1.0	1.0328	6.0
1.0085	1.5	1.0353	6.5
1.0113	2.0	1.0377	7.0
1.0141	2.5	1.0401	7.5
1.0168	3.0	1.0426	8.0
1.0194	3.5	1.0450	8.5
1.0221	4.0	1.0474	9.0
1.0248	4.5	1.0497	9.5
1.0275	5.0	1.0520	10.0

DENSITIES OF WATER SOLUTIONS OF SODIUM HYDRATE AT 15° CELSIUS.

(*Eder's Year Book of Photography.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. NaOH.	°Tw.	°Bé	Sp. Gr.	Per Cent. NaOH.
2	1.4	1.012	1	34	20.9	1.170	15
5	3.4	1.023	2	45	26.4	1.225	20
7	4.7	1.035	3	56	31.5	1.279	25
9	6.0	1.046	4	66	35.8	1.332	30
12	8.0	1.059	5	77	40.1	1.384	35
14	9.4	1.070	6	87	43.8	1.437	40
16	10.6	1.081	7	98	47.4	1.488	45
18	11.9	1.092	8	108	50.6	1.540	50
21	13.6	1.103	9	118	53.6	1.591	55
23	14.9	1.115	10	129	56.6	1.643	60

DENSITIES OF WATER SOLUTIONS OF SODIUM THIOSULPHATE AT 20° CELSIUS.

(*Schiff.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. $Na_2S_2O_3+5Aq.$	Per Cent. $Na_2S_2O_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $Na_2S_2O_3+5Aq.$	Per Cent. $Na_2S_2O_3$.
5	3.4	1.0264	5	3.185	33	20.3	1.1676	30	19.113
11	7.4	1.0529	10	6.371	40	24.0	1.1986	35	22.298
16	10.6	1.0807	15	9.556	46	26.9	1.2297	40	25.484
22	14.2	1.1087	20	12.742	52	29.7	1.2624	45	28.669
28	17.7	1.1381	25	15.927	59	32.8	1.2954	50	31.855

DENSITIES OF WATER SOLUTIONS OF CERTAIN ALKALINE BROMIDES AT 20° CELSIUS.

(*Gerlach.*)

Per. Cent.	Potassium Bromide.	Lithium Bromide.	Sodium Bromide.	Barium Bromide.	Calcium Bromide.	Strontium Bromide.	Magnesium Bromide.
5	1.037	1.035	1.040	1.045	1.044	1.046	1.043
10	1.075	1.072	1.080	1.092	1.089	1.094	1.087
15	1.116	1.113	1.125	1.144	1.139	1.146	1.137
20	1.159	1.156	1.174	1.201	1.194	1.204	1.191
25	1.207	1.204	1.226	1.262	1.252	1.266	1.247
30	1.256	1.254	1.281	1.329	1.315	1.332	1.310
35	1.309	1.309	1.344	1.405	1.385	1.410	1.377
40	1.366	1.368	1.410	1.485	1.461	1.492	1.451
45	1.430	1.432	1.483	1.580	1.549	1.590	1.535
50		1.500	1.565	1.685	1.641	1.694	1.625
55		1.580		1.800			

DENSITIES OF WATER SOLUTIONS OF CERTAIN ALKALINE IODIDES AT 20° CELSIUS.

(*Gerlach.*)

Per Cent.	Potassium Iodide.	Lithium Iodide.	Sodium Iodide.	Barium Iodide.	Calcium Iodide.	Strontium Iodide.	Magnesium Iodide.
5	1.038	1.038	1.040	1.045	1.044	1.045	1.043
10	1.078	1.079	1.082	1.091	1.090	1.091	1.088
15	1.120	1.124	1.128	1.143	1.140	1.142	1.139
20	1.166	1.172	1.179	1.201	1.198	1.200	1.194
25	1.218	1.224	1.234	1.265	1.260	1.262	1.254
30	1.271	1 280	1.294	1.333	1.321	1.330	1.320
35	1.331	1.344	1.360	1.412	1.398	1.410	1.395
40	1.396	1.414	1.432	1.495	1.477	1.491	1.474
45	1.469	1.489	1.510	1.596	1.567	1.590	1.553
50	1.546	1.575	1.600	1.704	1.665	1.695	1.688
55	1.636	1.670	1.700	1.825	1.780	1.812	1.780
60	1.734	1.777	1.810	1.970	1.910	1.955	1.915
65						2.150	

DENSITIES OF WATER SOLUTIONS OF SODIUM CHLORIDE AT 20° CELSIUS.

(*Schiff.*)

Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.
1	1	0.7	1.0066	7	10	6.7	1.0483	13	19	12.4	1.0934	19	28	17.7	1.1408	25	38	23.0	1.1906
2	3	2.1	1.0133	8	11	7.4	1.0556	14	20	13.0	1.1012	20	30	18.8	1.1490	26	40	24.0	1.1990
3	4	2.7	1.0201	9	13	8.7	1.0630	15	22	14.2	1.1090	21	31	19.3	1.1572	27	41	24.5	1.2075
4	5	3.4	1.0270	10	14	9.4	1.0705	16	23	14.9	1.1168	22	33	20.3	1.1655	--	--	-- -	-- ---
5	7	4.7	1.0340	11	16	10.6	1.0781	17	25	16.0	1.1247	23	35	21.4	1.1738	--	--	-- -	-- ---
6	8	5.4	1.0411	12	17	11.2	1.0857	18	27	17.1	1.1327	24	36	22.0	1.1822	--	--	-- -	-- ---

DENSITIES OF WATER SOLUTIONS OF AMMONIA AT 14° CELSIUS.

(*Carius.*)

Specific Gravity.	Percentage of Ammonia.	Specific Gravity.	Percentage of Ammonia.
0.8844	36.0	0.9314	18.0
0.8864	35.0	0.9347	17.0
0.8885	34,0	0.9380	16.0
0.8907	33.0	0.9414	15.0
0.8929	32.0	0.9449	14.0
0.8953	31.0	0.9484	13.0
0.8976	30.0	0.9520	12.0
0.9001	29.0	0.9556	11.0
0.9026	28.0	0.9593	10.0
0.9052	27.0	0.9631	9.0
0.9078	26.0	0.9670	8.0
0.9106	25.0	0.9709	7.0
0.9133	24.0	0.9749	6.0
0.9162	23.0	0.9790	5.0
0.9191	22.0	0.9831	4.0
0.9221	21.0	0.9873	3.0
0.9251	20.0	0.9915	2.0
0.9283	19.0	0.9959	1.0

DENSITIES OF SODIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Schiff in *Chemiker Kalender*. Temperature 23° C. (73° F.). The gallon is that of the United States, and contains 133.28 ounces of water. The ounce contains 437.5 grains. The first four columns give percentage by weight and weight in 100 volumes of the crystals (10 molecules water) and dry salt respectively.

Grams of Crystals in 100 grms	Grams of Crystals in 100 c. c.	Grams of Dry Salt in 100 grms.	Grams of Dry Salt in 100 c. c.	Ounces Crystals in one gallon.	Grains Crystals in one fluid ounce.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
50	60.2	18.53	22.31	80	262.5	1.204	24	40
45	53.2	16.67	19.75	71	232.	1.183	.23	38
40	46.5	14.82	17.30	62	203.	1.162	20	32
35	40.0	12.97	14.83	53	174.5	1.141	18	28
30	33.6	11.12	12.32	45	147.	1.120	16	24
25	27.5	9.26	10.23	37	110.	1.099	13	20
20	21.6	7.41	8.00	29	94.5	1.079	10.5	16
15	15.9	5.56	5.83	21	69.5	1.059	8	12
10	10.4	3.70	3.85	14	45.5	1.039	5.4	8
5	5.1	1.85	1.86	7	22.3	1.019	2.7	4
2	2.0	.74	.76	3	8.8	1.008	1	1.4

DENSITIES OF POTASSIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Gerlach in *Chemiker Kalender*. Temperature 15° C. (60° F.). The gallon is that of the United States, and contains 133.28 ounces of water. The ounce contains 437.5 grains. Dry potassium carbonate is understood in the figures given, and the first two columns give percentages by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
52	81.6	109.	357	1.570	53	114
50	77.2	103.	338	1.544	51	108
45	66.6	89.	291	1.480	47	96
40	56.7	76.	248	1.419	43	84
35	47.5	63.	208	1.359	38	72
30	39.0	52.	171	1.301	33	58
25	31.1	41.5	137	1.246	29	51
20	23.8	32.	105	1.193	24	40
15	17.1	23.	75	1.142	18	28
10	10.9	14.5	44	1.093	12	18
5	5.2	7.	23	1.046	7	10
2	2.0	2.7	9	1.018	2.5	3

DENSITIES OF SATURATED SOLUTIONS.

The following solutions are saturated at 60° F. and the table gives the specific gravity, degrees Beaume and Twaddell, and the percentage of salt *by weight*.

	Specific Gravity.	Degree Beaume.	Degree Twaddell.	Percentage of Salt by Weight.
Alum (Ammonia) Crystallized	1.048	7	10	11
Potassium Carbonate Dry	1.571	52	112	52
" Oxalate	1.262	30	52	25
Sodium Carbonate (10 molecules water)	1.199	24	40	49
" Hyposulphite (5 " ")	1.210	25	41	58
" Sulphite (7 " ")	1.197	24	40	35

DENSITIES OF SODIUM SULPHITE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon experiments made specially for the construction of this table, temperature 15° C. (60° F.). The gallon is that of the United States, and contains 133.28 ounces of water; the ounce contains 437.5 grains of water. Crystallized sodium sulphite with seven molecules of water is understood in the figures given, and the first two columns give percentage by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
35.1	42.0	54.2	184	1.1969	24	40
30	35.0	46.6	153	1.1675	21	34
25	28.5	38.0	122	1.1381	17	27
20	22.2	29.6	97	1.1087	11	17
15	16.2	21.6	61	1.0793	10.5	15
10	10.5	14.0	46	1.0499	7.0	10
5	5.1	6.8	22.3	1.0205	3.0	4
2	2.0	2.7	8.8	1.0100	2.0	2

DENSITIES OF HOT SOLUTIONS FOR OBTAINING CRYSTALS OF THE FOLLOWING SUBSTANCES ON COOLING.

Substance.	°Bé.	Substance.	°Be.
Acetate of Lead	42	Chloride of Calcium	40
" " Sodium	22	" " Copper	45
Oxalic Acid	12	" " Magnesium	35
Ammonia Alum	20	" " Potassium	25
Potash "	20	Bichromate of Ammonia	28
Nitrate of Lead	50	" " Potash	38
" " Potash	28	Chromate of Sodium	45
" " Soda	40	Hyposulphite of Sodium	3
Barium Hydrate	12	Iodide of Potassium	60
Borax	24	Oxalate of "	30
Bromide of Ammonium	30	Permanganate of Potassium	25
" " Cadmium	65	Phosphate of Soda	20
" " Potassium	40	Sulphate of Copper	30
" " Sodium	55	" " Iron (Copperas)	31
" " Strontium	50	" " Zinc	45
Carbonate of Sodium	28	Sulphite of Soda	25
Chlorate of Potash	22	Sulphocyanide of Ammonia	18
" " Sodium	43	Neutral Tartrate of Potash	38
Chloride of Ammonium	12	Rochelle Salts	36
" " Barium	35		

EQUIVALENT WEIGHTS OF CERTAIN SILVER COMPOUNDS, ETC.

By A. H. Elliott, Ph.D.

One part of silver, or one part of silver nitrate, is equal to the following parts of other combinations:

	Silver Chloride.	Silver Bromide.	Silver Iodide.	Potassium Chloride.	Potassium Bromide.
Silver	1.328	1.740	2.176	.690	1.102
Silver Nitrate.	.844	1.106	1.382	.439	.701

	Potassium Iodide.	Sodium Chloride.	Sodium Bromide.	Sodium Iodide.	Ammonium Chloride.
Silver	1.538	.541	.953	1.388	.495
Silver Nitrate.	.971	.344	.606	.882	.315

	Ammonium Bromide.	Ammonium Iodide.	Cadmium Chloride.	Cadmium Bromide.	Cadmium Iodide.
Silver	.907	1.342	1.363	1.776	2.211
Silver Nitrate.	.576	.853	.538	.800	1.076

EQUIVALENT WEIGHTS OF CERTAIN GOLD COMPOUNDS.

(*Eder's Year Book of Photography.*)

Gold.	Gold Chloride (Anhyd.)	Gold Chloride (Crystallized.)	Double Chloride of Gold and Potassium.	Double Chloride of Gold and Sodium.	Double Chloride of Gold and Calcium.	Fizeau's Salt.
1	1.540	1.814	2.148	2.020	2.096	2.670
0.649	1	1.178	1.394	1.310	1.360	1.700
0.554	0.849	1	1.183	1.113	1.155	1.471
0.465	0.717	0.844	1	0.941	0.976	1.219
0.494	0.762	0.898	1.062	1	1.037	1.321
0.477	0.735	0.869	1.024	1.963	1	1.273
0.374	0.575	0.679	0.804	0.757	0.781	1

ACETIC ACID.

Quantities of crystallizable acid in mixtures of acetic acid and water of various densities at 15° C.

Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.
100	1.0553	75	1.0746	50	1.0615	25	1.0350
99	1.0580	74	1.0744	49	1.0607	24	1.0337
98	1.0604	73	1.0742	48	1.0598	23	1.0324
97	1.0625	72	1.0740	47	1.0589	22	1.0311
96	1.0644	71	1.0737	46	1.0580	21	1.0298
95	1.0660	70	1.0733	45	1.0571	20	1.0284
94	1.0674	69	1.0729	44	1.0562	19	1.0270
93	1.0686	68	1.0725	43	1.0552	18	1.0256
92	1.0696	67	1.0721	42	1.0543	17	1.0242
91	1.0705	66	1.0717	41	1.0533	16	1.0228
90	1.0713	65	1.0712	40	1.0523	15	1.0214
89	1.0720	64	1.0707	39	1.0513	14	1.0201
88	1.0726	63	1.0702	38	1.0502	13	1.0185
87	1.0731	62	1.0697	37	1.0492	12	1.0171
86	1.0736	61	1.0691	36	1.0481	11	1.0157
85	1.0739	60	1.0685	35	1.0470	10	1.0142
84	1.0742	59	1.0679	34	1.0459	9	1.0127
83	1.0744	58	1.0673	33	1.0447	8	1.0113
82	1.0746	57	1.0666	32	1.0436	7	1.0098
81	1.0747	56	1.0660	31	1.0424	6	1.0083
80	1.0748	55	1.0653	30	1.0412	5	1.0067
79	1.0748	54	1.0646	29	1.0400	4	1.0052
78	1.0748	53	1.0638	28	1.0388	3	1.0037
77	1.0748	52	1.0631	27	1.0375	2	1.0022
76	1.0747	51	1.0628	26	1.0363	1	1.0007

N. B.—The density of the mixture increases until nearly 25 % of water is present, after which it again decreases. Acetic acid is, therefore, better tested volumetrically with a standard solution of alkali.

SULPHUROUS ACID.

Quantities of anhydrous sulphurous acid in solutions of different densities.

(*F. Authon.*)

Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.
1.046	9.54	1.027	6.68	1.020	4.77	1.013	2.86
1.036	8.59	1.023	5.72	1.016	3.82	1.009	1.90
1.031	7.63					1.005	0.95

ALCOHOL.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s. g. .7932) and Water, by Weight and by Volume, at 14° R. (63.5° F.).—MEISSNER.

Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.	Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.
100	0	0.7932	0.7932	49	51	0.9196	0.9324
99	1	0.796	0.7969	48	52	0.9219	0.9344
98	2	0.7988	0.8006	47	53	0.9242	0.9364
97	3	0.8016	0.8042	46	54	0.9264	0.9384
96	4	0.8045	0.8078	45	55	0.928	0.9404
95	5	0.8074	0.8114	44	56	0.9308	0.9424
94	6	0.8104	0.815	43	57	0.9329	0.9443
93	7	0.8135	0.8185	42	58	0.9350	0.9461
92	8	0.8166	0.8219	41	59	0.9371	0.9478
91	9	0.8196	0.8253	40	60	0.9391	0.9495
90	10	0.8225	0.8286	39	61	0.9410	0.9512
89	11	0.8252	0.8317	38	62	0.9429	0 9529
88	12	0.8279	0.8346	37	63	0.9448	0.9547
87	13	0.8304	0.8373	36	64	0.9467	0.9564
86	14	0.8329	0.840	35	65	0.9486	0.958
85	15	0.8353	0.8427	34	66	0.9505	0.9595
84	16	0.8376	0.8454	33	67	0.9524	0.9609
83	17	0.8399	0.8481	32	68	0.9543	0.9621
82	18	0.8422	0.8508	31	69	0.9561	0.9632
81	19	0.8446	0.8534	30	70	0.9578	0.9643
80	20	0.847	0.8561	29	71	0.9594	0.9654
79	21	0.8494	0.8596	28	72	0.9608	0.9665
78	22	0.8519	0.8616	27	73	0.9621	0.9676
77	23	0.8543	0.8642	26	74	0.9634	0.9688
76	24	0.8567	0.8668	25	75	0.9647	0.970
75	25	0.859	0.8695	24	76	0.966	0.9712
74	26	0.8613	0.8723	23	77	0.9673	0.9723
73	27	0.8635	0.8751	22	78	0.9686	0.9734
72	28	0.8657	0.8779	21	79	0.9699	0.9745
71	29	0.868	0.8806	20	80	0.9712	0.9756
70	30	0.8704	0.8833	19	81	0.9725	0.9766
69	31	0.8729	0.886	18	82	0.9738	0.9775
68	32	0.8755	0.8885	17	83	0.9751	0.9784
67	33	0.8781	0.891	16	84	0.9763	0.9793
66	34	0.8806	0.8934	15	85	0.9795	0.9803
65	35	0.8831	0.8958	14	86	0.9786	0.9813
64	36	0.8855	0.8982	13	87	0.9796	0.9823
63	37	0.8879	0.9096	12	88	0.9806	0.9834
62	38	0.8902	0.9029	11	89	0.9817	0.9846
61	39	0.8925	0.9052	10	90	0.9830	0.9859
60	40	0.8948	0.9075	9	91	0.9844	0.9873
59	41	0.8971	0.9098	8	92	0.9860	0.9888
58	42	0.8994	0.9121	7	93	0.9873	0.9901
57	43	0.9016	0.9145	6	94	0.9897	0.9915
56	44	0.9038	0.9168	5	95	0.9914	0.9929
55	45	0.9060	0.9191	4	96	0.9931	0.9943
54	46	0.9082	0.9124	3	97	0.9948	0.9957
53	47	0.9104	0.9237	2	98	0.9965	0.9971
52	48	0.9127	0.9159	1	99	0.9982	0.9985
51	49	0.915	0.9281	0	100	1.0000	1.0000
50	50	0.6173	0.9303	--	--	--	--

THE SIMPLIFICATION OF EMULSION CALCULATIONS.

From British Journal of Photography Almanac.

With a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognized style will find their labors materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide----	98.	1.734	.576	1.918	.521	1.106
Potassium " ----	119.1	1.427	.700	1.578	.633	
Sodium " ----	103.	1.650	.606	1.825	.548	
Cadmium " com.	172.	.988	1.012	1.093	.915	
" " anh.	136.	1.25	.800	1.382	.723	
Zinc " ----	112.1	1.509	.663	1.670	.600	
Ammonium chloride----	53.5	3.177	.315	2.682	.373	.844
Sodium " ----	58.5	2.906	.344	2.453	.408	
Ammonium iodide------	145.	1.172	.853	1.620	.617	1.382
Potassium " ------	166.1	1.023	.977	1.415	.707	
Sodium " ------	150.	1.133	.882	1.566	.638	
Cadmium " ------	183.	.929	1.076	1.284	.778	

The principal bromides, chlorides and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. 1 presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:

Bromide of potassium............	150 grains.	Chloride of ammonium..........	10 grains.
Iodide of potassium..............	10 "	Gelatine..........................	200 "

Now, we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:

Potassium bromide..............................	150 × 1.427 = 214.	Weight silver nitrate required.
" iodide..............................	10 × 1.023 = 10.23	
Chloride of ammonium.........................	10 × 3.177 = 31.77	

or the total quantity of silver nitrate required for full conversion.. 256. grains.

No. II.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide (Coml.)	Cadmium Bromide (Anhyd.).	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodi·e.	Cadmium Iodide.
Ammonium bromide....	1	.823	.951	.57	.72	.87	1.832	1.675	.676	.59	.653	.535
Potassium "	1.215	1	1.156	.692	.876	1.058	2.226	2.036	.821	.717	.794	.651
Sodium "	1.051	.865	1	.599	.757	.915	1.925	1.761	.71	.62	.686	.563
Cadmium " com.	1.755	1.444	1.67	1	1.265	1.527	3.215	2.94	1.186	1.035	1.146	.94
" " anh.	1.387	1.141	1.32	.79	1	1.207	2.542	2.324	.938	.819	.906	.743
Zinc "	1.14)	.945	1.093	.655	.828	1	2.104	1.925	.776	.678	.75	.615
Ammonium chloride.....	.546	.449	.519	.311	.393	.475	1	.914	.369	.322	.356	.292
Sodium "	.597	.491	.568	.34	.43	.519	1.093	1	.403	.352	.39	.319
Ammonium iodide......	1.479	1.217	1.408	.843	1.066	1.287	2.712	2.478	1	.873	.966	.792
Potassium "	1.695	1.394	1.612	.965	1.221	1 475	3.104	2.839	1.145	1	1.107	.907
Sodium "	1.53	1.259	1.456	.872	1.103	1.332	2.803	2.564	1.034	.903	1	.819
Cadmium "	1.867	1.536	1.776	1.064	1.345	1.625	3.42	3.128	1.262	1.102	1.22	1

Table No. II gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in large type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide, we take the number in the same column which stands against the latter salt in the margin, viz., 1.215; that is to say, 1.215 grain of potassium bromide will be required to do the same work as one.

PREPARING PERCENTAGE SOLUTIONS.

By C. C. Sherrard, Ph. C.

The first table gives percentage solutions; the second gives parts in 1,000 or less. The use of the first is as follows: Run down column one until the correct percentage wanted is found, then move to the right along the line until the column is found giving the amount of fluid measure to be made up; at the intersection will be found the weight of salt required. It must be remembered that this is the amount of water to take, and not q. s. water to make the volume; also that these tables are true only for water, and not for alcohol or other fluids.

For Making any Quantity of Percentage Solutions.

	For each 1 fluid ounce of water take of the salt	For each 2 fluid ounces of water take of the salt	For each 3 fluid ounces of water take of the salt	For each 4 fluid ounces of water take of the salt	For each 5 fluid ounces of water take of the salt	For each 10 fluid ounces of water take of the salt	For each 16 fluid ounces of water take of the salt
To make	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
1 per cent	4.557	9.114	13.671	18.228	22.785	45.57	72.912
2 per cent	9.114	18.228	27.342	36.456	45.570	91.14	145.824
3 per cent	13.671	27.352	41.013	54.684	68,355	136.71	218.416
4 per cent	18.228	36.456	54.684	72.912	91.14	182.28	291.648
5 per cent	22.785	45.57	68.355	91.14	113.925	227.85	364.56
10 per cent	45.57	91.14	136.71	182.28	227.85	455.7	729.12
15 per cent	68.355	136.71	205.065	273.42	341.775	68.355	1093.68
20 per cent	91.14	182.28	273.42	364.56	455.70	911.4	1458.24
25 per cent	113.925	227.85	341.775	455.70	569.625	1139.25	1822.80
40 per cent	182.28	364.56	546.84	729.12	911.4	1822.8	2916.48

For Making any Quantity of Solution When Stated in Parts per 1,000, 100, etc.

	For each 1 fluid ounce of water take of the salt	For each 2 fluid ounces of water take of the salt	For each 3 fluid ounces of water take of the salt	For each 4 fluid ounces of water take of the salt	For each 5 fluid ounces of water take of the salt	For each 10 fluid ounces of water take of the salt	For each 16 fluid ounces of water take of the salt
To make solution of	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
1 in 1,000	.4557	.9114	1.3671	1.8228	2.278	4.557	7.291
1 in 500	.9114	1.8228	2.7342	3.6456	4.557	9.114	14.582
1 in 400	1.139	2.278	3.4177	4.557	5.695	11.392	18.228
1 in 300	1.519	3.035	4.557	6.076	7.59	15.19	24.304
1 in 200	2.2785	4.557	6.8355	9.114	11.39	22.785	36.456
1 in 100	4.557	9.114	13.671	18.228	22.785	45.57	72.912
1 in 50	9.114	18.228	27.342	36.456	45.57	91.14	145.824
1 in 25	18.228	36.456	54.684	72.912	91.14	182.28	291.648
1 in 10	45.570	91.140	136.710	182.280	227.85	455.70	729.120
1 in 5	91.14	182.28	273.42	364.56	455.7	911.4	1458.24

We may say that, in giving the above figures, the resulting solution is correct as regards percentage composition, though it may measure slightly more than the water taken, owing to the increase in volume which always take place in some degree when a solid passes into a solution in a given amount of liquid. This expansion is not appreciable for small amounts of the solid, say up to 5 per cent., but at 25 per cent. or more it may be noticeable.

THE CONVERSION OF GRAMMES (OR CUBIC CENTIMETERS) INTO OUNCES AND GRAINS, and *vice versa*.

Conversion of Grammes into Grains.

Grammes.	Grains.
1	15.43
2	30.86
3	46.29
4	61.73
5	77.16
6	92.59
7	108.03
8	123.46
9	138.89

Conversion of Grammes into Troy Ounces.

Grammes.	Troy Ounces.
1	.03215
2	.06430
3	.09645
4	.12860
5	.16075
6	.19290
7	.22505
8	.25720
9	.28935

Conversion of Grammes into Avoirdupois Ounces.

Grammes.	Avoirdupois Ounces.
1	.03527
2	.07054
3	.10581
4	.14108
5	.17635
6	.21162
7	.24689
8	.28216
9	.31743

Conversion of Grains into Grammes.

Grains.	Grammes.
1	.0648
2	.1296
3	.1944
4	.2592
5	.3240
6	.3888
7	.4536
8	.5184
9	.5832

Conversion of Troy Ounces into Grammes.

Troy Ounces.	Grammes.
1	31.103
2	62.207
3	93.310
4	124.414
5	155.517
6	186.621
7	217.724
8	248 828
9	279.931

Conversion of Avoirdupois Ounces into Grammes.

Avoirdupois Ounces.	Grammes.
1	28.349
2	56.699
3	85.048
4	113.398
5	141.747
6	170.097
7	198.446
8	226.796
9	255.145

The use of the tables will be best illustrated by an example. Supposing that it is desired to find the equivalent in grains of 324.51 grammes, we proceed by breaking up this number into the following series of constituent parts, and finding the grain-equivalent of each part from the table.

Portions of original number.	Equivalents in grains.
300.	4630.
20.	308.6
4.	61.73
.50	7.716
.01	.1524
	5008.1984

The required quantity is 5008.2 grains. The numbers taken from the table will, in most cases, require a change as regards the position of the decimal point; thus, to find the value of 300 grammes, one refers to the table and finds 46.30 given as the equivalent, and a mere shifting of the decimal point two places towards the right multiplies this by 100, or gives the required number. In a similar manner, by shifting the decimal place of 30.86 one place to the right, we obtain the value in grains of 20 grammes; while the number 61.73 is taken from the table without alteration as the equivalent of 4 grammes. For .50 the table number must have its point shifted to the left, making it 7.716 instead of 77.16; and finally the value of .01 is obtained by shifting the point of 15.43 two places to the left.

THERMOMETRIC TABLES.

Showing the Assimilation of the Thermometers in Use Throughout the World.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80.0	212.0	49	39.2	120.2
99	79.2	210.0	48	38.4	118.4
98	78.4	208.4	47	37.6	116.6
97	77.6	206.6	46	36.8	114.8
96	76.8	204.8	45	36.0	113.0
95	76.0	203.0	44	35.2	111.2
94	75.2	201.2	43	34.8	109.4
93	74.4	199.4	42	33.6	107.6
92	73.6	197.6	41	32.8	105.8
91	72.8	195.8	40	32.0	104.0
90	72.0	194.0	39	31.2	102.2
89	71.2	192.2	38	30.4	100.4
88	70.4	190.4	37	29.6	98.6
87	69.6	188.6	36	28.8	96.8
86	68.8	186.8	35	28.0	95.0
85	68.0	185.0	34	27.2	93.2
84	67.2	183.2	33	26.4	91.4
83	66.4	181.4	32	25.6	89.6
82	65.6	179.6	31	24.8	87.8
81	64.8	177.8	30	24.0	86.0
80	64.0	176.0	29	23.2	84.2
79	63.2	174.2	28	22.4	82.4
78	62.4	172.4	27	21.6	80.6
77	61.6	170.6	26	20.8	78.8
76	60.8	168.8	25	20.0	77.0
75	60.0	167.0	24	19.2	75.2
74	59.2	165.2	23	18.4	73.4
73	58.4	163.4	22	17.6	71.6
72	57.6	161.6	21	16.8	69.8
71	56.8	159.8	20	16.0	68.0
70	56.0	158.0	19	15.2	66.2
69	55.2	156.2	18	14.4	64.4
68	54.4	154.4	17	13.6	62.6
67	53.6	152.6	16	12.8	60.8
66	52.8	150.8	15	12.0	59.0
65	52.0	149.0	14	11.2	57.2
64	51.2	147.2	13	10.4	55.4
63	50.4	145.4	12	9.6	53.6
62	49.6	143.6	11	8.8	51.8
61	48.8	141.8	10	8.0	50.0
60	48.0	140.0	9	7.2	48.2
59	47.2	138.2	8	6.4	46.4
58	46.4	136.4	7	5.6	44.6
57	45.6	134.6	6	4.8	42.8
56	44.8	132.8	5	4.0	41.0
55	44.0	131.0	4	3.2	39.2
54	43.2	129.2	3	2.4	37.4
53	42.4	127.4	2	1.6	36.5
52	41.6	125.6	1	0.8	33.8
51	40.8	123.8	0	0.0	32.0
50	40.0	122.0			

DR. SCOTT'S TABLE OF COMPARATIVE EXPOSURES.

The following table, compiled by Dr. J. A. Scott, shows the comparative value of daylight at different hours of the day and seasons of the year, and is intended for use in conjunction with that of Mr. W. K. Burton :

Table of Comparative Exposures.

Hour of Day. A.M.	Hour of Day. P.M.	June.	May, July.	April, Aug.	Mar., Sept.	Feb., Oct.	Jan., Nov.	Dec.
12		1	1	1¼	1½	2	3½	4
11	1	1	1	1¼	1½	2½	4	5
10	2	1	1	1¼	1¾	3	5	6
9	3	1	1¼	1½	2	4	*12	*16
8	4	1½	1½	2	3	*10	--	--
7	5	2	2½	3	*6	--	--	--
6	6	2½	*3	*6	--	--	--	--
5	7	*5	*6	--	--	--	--	--
4	8	*12	--	--	--	--	--	--

* The accuracy of these figures would be affected by a yellow sunset.

MR. BURTON'S TABLE OF COMPARATIVE EXPOSURES

(SLIGHTLY ALTERED).

	Sea and Sky.	Open Landscape.	Landscape and Foreground. / Buildings.	Heavy Foliage. Foreground. / Portrait out of Doors.	Portrait in Studio Light.	Portrait in Ordinary Room.	Under Trees. / Fairly Lighted Interiors.	Badly Lighted Interiors.
F/16	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	1 sec.	2 sec.	16 sec.	1 min.	2½ min.	½ hour.
F/32	$\frac{2}{5}$ sec.	1⅓ sec.	4 sec.	8 sec.	1 min.	4 min.	10 min.	2 hours.
F/64	1½ sec.	5 sec.	16 sec.	32 sec.	4 min.	16 min.	40 min.	8 hours.

ENLARGEMENTS.

From the British Journal of Photography Almanac.

FOCUS OF LENS.	TIMES OF ENLARGEMENT AND REDUCTION.							
Inches.	**1** Inch.	**2** Inches.	**3** Inches.	**4** Inches.	**5** Inches.	**6** Inches.	**7** Inches.	**8** Inches.
2	4 4	6 3	8 $2\frac{3}{4}$	10 $2\frac{1}{2}$	12 $2\frac{2}{5}$	14 $2\frac{1}{3}$	16 $2\frac{2}{7}$	18 $2\frac{1}{4}$
$2\frac{1}{2}$	5 5	$7\frac{1}{2}$ $3\frac{3}{4}$	10 $3\frac{1}{3}$	$12\frac{1}{2}$ $3\frac{1}{8}$	15 3	$17\frac{1}{2}$ $2\frac{11}{12}$	20 $2\frac{6}{7}$	$22\frac{1}{2}$ $2\frac{13}{16}$
3	6 6	9 $4\frac{1}{2}$	12 4	15 $3\frac{3}{4}$	18 $3\frac{3}{5}$	21 $3\frac{1}{2}$	24 $3\frac{3}{7}$	27 $3\frac{3}{8}$
$3\frac{1}{2}$	7 7	$10\frac{1}{2}$ $5\frac{1}{4}$	14 $4\frac{2}{3}$	$17\frac{1}{2}$ $4\frac{3}{4}$	21 $4\frac{1}{5}$	$24\frac{1}{2}$ $4\frac{1}{12}$	28 4	$31\frac{1}{2}$ $3\frac{15}{16}$
4	8 8	12 6	16 $5\frac{1}{4}$	20 5	24 $5\frac{4}{5}$	28 $4\frac{2}{3}$	32 $4\frac{4}{7}$	36 $4\frac{1}{2}$
$4\frac{1}{2}$	9 9	$13\frac{1}{2}$ $6\frac{3}{4}$	18 6	$22\frac{1}{2}$ $5\frac{5}{8}$	27 $5\frac{2}{5}$	$31\frac{1}{2}$ $5\frac{1}{4}$	36 $5\frac{1}{7}$	$40\frac{1}{2}$ $5\frac{1}{16}$
5	10 10	15 $7\frac{1}{2}$	20 $6\frac{2}{3}$	25 $6\frac{1}{4}$	30 6	35 $5\frac{5}{6}$	40 $5\frac{5}{7}$	45 $5\frac{5}{8}$
$5\frac{1}{2}$	11 11	$16\frac{1}{2}$ $8\frac{1}{4}$	22 $8\frac{1}{8}$	$27\frac{1}{2}$ $6\frac{7}{8}$	33 $6\frac{1}{2}$	$38\frac{1}{2}$ $6\frac{5}{12}$	44 $6\frac{2}{7}$	$49\frac{1}{2}$ $6\frac{3}{16}$
6	12 12	18 9	24 8	30 $7\frac{1}{2}$	36 $7\frac{1}{6}$	42 7	48 $6\frac{6}{7}$	54 $6\frac{3}{4}$
7	14 14	21 $10\frac{1}{2}$	28 $9\frac{1}{3}$	35 $8\frac{3}{4}$	42 $8\frac{2}{5}$	49 $8\frac{1}{6}$	56 8	63 $7\frac{7}{8}$
8	16 16	24 12	32 $10\frac{2}{3}$	40 10	48 $9\frac{3}{5}$	56 $9\frac{1}{3}$	64 $9\frac{1}{7}$	72 9
9	18 18	27 $13\frac{1}{2}$	36 12	45 $11\frac{1}{4}$	54 $10\frac{4}{5}$	63 $10\frac{1}{2}$	72 $10\frac{2}{7}$	81 $10\frac{1}{8}$

The object of this table is to enable any manipulator who is about to enlarge (or rednce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accnrately from its optical centre. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focns. He must therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—$7\frac{1}{2}$. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2, and so on with any other numbers.

COMPARATIVE EXPOSURES FOR ENLARGING AND REDUCING.

Compiled by Mr. E. Ferrero, (Camera Club, London).

f/16	f/18	f/20	f/22	f/24	f/26	f/28	f/32	f/36	f/40	f/44	f/48	f/52
m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0 9	0 11	0 14	0 17	0 20	0 23	0 27	0 36	0 45	0 55	1 7	1 20	1 34
0 13	0 16	0 21	0 25	0 30	0 34	0 40	0 54	1 7	1 23	1 41	2 0	2 20
0 18	0 22	0 28	0 32	0 40	0 46	0 54	1 12	1 30	1 51	2 15	2 40	3 7
0 22	0 28	0 35	0 42	0 50	0 58	1 8	1 30	1 52	2 18	2 48	3 20	3 54
0 27	0 33	0 42	0 50	1 0	1 9	1 21	1 48	2 15	2 46	3 22	4 0	4 40
0 36	0 45	0 55	1 15	1 19	1 33	1 48	2 24	3 0	3 42	4 29	5 20	6 15
0 45	0 55	1 10	1 24	1 40	1 54	2 15	3 0	3 42	4 37	5 36	6 40	7 48
0 55	1 6	1 23	1 38	1 59	2 18	2 42	3 36	4 30	5 33	6 44	8 0	9 21
1 3	1 18	1 37	1 54	2 19	2 42	3 9	4 12	5 15	6 28	7 52	9 20	10 55
1 12	1 30	1 50	2 10	2 38	3 7	3 36	4 48	6 0	7 24	8 58	10 40	12 30
1 21	1 40	2 5	2 30	2 59	3 29	4 4	5 24	6 42	8 19	10 5	12 0	14 3
1 30	1 50	2 20	2 50	3 20	3 48	4 30	6 0	7 22	9 12	11 12	13 20	15 36
1 48	2 12	2 46	3 16	4 0	4 36	5 24	7 12	8 52	11 5	13 28	16 0	18 40
2 6	2 35	3 13	3 48	4 37	5 23	6 18	8 24	10 30	12 56	15 43	18 40	21 50
2 24	3 0	3 40	4 20	5 17	6 14	7 12	9 36	12 0	14 48	17 55	21 20	25 0
2 42	3 20	4 10	4 58	5 58	6 58	8 7	10 48	13 24	16 36	20 10	24 0	28 6
3 0	3 40	4 40	5 36	6 40	7 36	9 0	12 0	14 44	18 25	22 24	26 40	31 12
3 22	4 10	5 15	6 18	7 30	8 33	10 10	13 30	16 36	20 48	25 12	30 0	35 10
3 45	4 36	5 50	7 0	8 19	9 30	11 15	15 0	18 24	23 0	28 0	33 20	39 4
4 7	5 5	6 25	7 42	9 9	10 27	12 27	16 30	20 18	25 20	30 48	36 40	42 57
4 30	6 30	7 0	8 24	10 0	11 24	13 30	18 0	22 6	27 40	33 36	40 0	46 54

COMPARATIVE EXPOSURES FOR ENLARGING AND REDUCING—*Continued.*

f/56	f/60	f/64	f/68	f/72	f/76	f/80	f/84	f/88	f/92	f/96	f/100
m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
1 48	2 5	2 22	2 40	3 0	3 20	3 42	4 4	4 28	4 54	5 20	5 47
2 42	3 7	3 33	4 0	4 30	5 0	5 33	6 6	6 42	7 21	8 0	8 40
3 37	4 10	4 44	5 20	6 0	6 40	7 24	8 9	8 57	9 48	10 40	11 33
4 30	5 17	5 55	6 40	7 30	8 21	9 15	10 9	11 12	12 17	13 20	14 27
5 25	6 15	7 5	8 0	9 0	10 1	11 6	12 12	13 25	14 42	16 0	17 20
7 12	8 20	9 28	10 40	12 0	13 22	14 48	16 17	17 54	19 36	21 20	23 7
9 0	10 34	11 50	13 22	15 0	16 42	18 30	20 21	22 23	24 33	26 40	28 54
10 50	12 30	14 10	16 1	18 0	20 2	22 12	24 25	26 50	29 24	32 0	34 40
12 40	14 34	16 33	18 42	21 0	23 23	25 54	28 30	31 19	34 18	37 20	40 27
14 24	16 48	18 55	21 22	24 0	26 43	29 36	32 33	35 48	39 12	42 40	46 15
16 12	18 45	21 18	24 3	27 0	30 3	33 18	36 38	40 17	44 10	48 0	52 0
18 0	21 8	23 40	26 44	30 0	33 24	37 0	40 42	44 46	48 56	53 20	57 48
21 40	24 58	28 21	32 0	36 0	40 5	44 24	48 50	53 40	58 48	64 0	69 0
25 20	29 7	33 6	37 23	42 0	46 45	51 48	57 0	62 39	69 0	74 40	81 0
28 48	33 17	37 50	42 43	48 0	53 27	59 12	65 7	71 36	78 0	85 0	92 0
32 36	37 30	42 35	48 5	54 0	60 6	66 36	73 15	80 20	88 0	96 0	104 0
36 0	42 17	47 20	53 28	60 0	66 47	74 0	81 24	89 0	98 0	106 0	116 0
40 48	46 50	53 15	60 20	67 27	75 8	83 15	91 31	100 0	110 0	120 0	130 0
45 0	52 50	59 10	66 40	74 55	83 30	92 30	101 38	111 0	122 0	133 0	144 0
49 51	58 13	65 5	73 30	82 25	91 0	101 45	111 45	124 0	135 0	146 0	159 0
54 0	63 26	71 0	80 0	89 55	100 10	111 0	122 6	134 0	147 0	160 0	174 0

DR. WOODMAN'S TABLE OF VIEW ANGLES.

DIVIDE THE BASE OF THE PLATE BY THE EQUIVALENT FOCUS OF THE LENS.

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees.		Degrees.		Degrees.
.282	16	.748	41	1.3	66
.3	17	.768	42	1.32	67
.317	18	.788	43	1.36	68
.335	19	.808	44	1.375	69
.353	20	.828	45	1.4	70
.37	21	.849	46	1.427	71
.389	22	.87	47	1.45	72
.407	23	.89	48	1.48	73
.425	24	.911	49	1.5	74
.443	25	.933	50	1.53	75
.462	26	.854	51	1.56	76
.48	27	.975	52	1.59	77
.5	28	1.	53	1.62	78
.517	29	1.02	54	1.649	79
.536	30	1.041	55	1.678	80
.555	31	1.063	56	1.7	81
.573	32	1.086	57	1.739	82
.592	33	1.108	58	1.769	83
.611	34	1.132	59	1.8	84
.631	35	1.155	60	1.833	85
.65	36	1.178	61	1.865	86
.67	37	1.2	62	1.898	87
.689	38	1.225	63	1.931	88
.708	39	1.25	64	1.965	89
.728	40	1.274	65	2.	90

This table has been calculated for the use of those who wish to know the precise *angle of view* included by any particular lens on a given size of plate. Its mode of use will be easily seen by inspection.

SIZES OF DRY PLATES MADE IN FRANCE AND GERMANY.

6½ × 9 c. m....... 2.5 × 3.6 inches.	21 × 29 c. m....... 8.2 × 10.6 inches.
9 × 12 " ...... 3.6 × 4.7 "	24 × 30 " .... 9.4 × 11.8 "
12 × 15 " ...... 4.7 × 5.9 "	27 × 33 " ....10.6 × 12.9 "
13 × 18 " ...... 5.1 × 7.0 "	27 × 35 " ....10.6 × 13.7 "
12 × 20 " ...... 4.7 × 7.8 "	30 × 40 " ....11.8 × 15.7 "
15 × 21 " ...... 5.9 × 8.2 "	40 × 50 " ....15.7 × 19.6 "
15 × 22 " ...... 5.9 × 8.6 "	50 × 60 " ....19.6 × 23.6 "
18 × 24 " ...... 7.2 × 9.4 "	

SIZES OF DRY PLATES MADE IN ITALY.

9 × 12 c. m....... 3.6 × 4.9 inches.	21 × 29 c. m....... 8.2 × 10.6 inches.
12 × 16 " ...... 4.7 × 6.3 "	24 × 30 " .... 9.4 × 11.8 "
12 × 18 " .... 4.7 × 7.2 "	29 × 33 " ....10.6 × 12.0 "
13 × 18 " .... 5.1 × 7.0 "	30 × 36 " ....11.8 × 14.1 "
12 × 20 " .... 4.7 × 7.8 "	40 × 50 " ....15.7 × 19.6 "
18 × 24 " .... 7.0 × 9.4 "	50 × 60 " ....19.6 × 23.6 "

EQUATIONS RELATING TO FOCI, Etc.

The following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:

Let p = Principal focus.
F = Greater conjugate do.
f = Lesser do. do.
$D = F + f$ = distance of image from object.
r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Effective diameter of diaphragm.
U. S. No. = "Uniform System" No. of do.
x = Comparative exposure required.

Then
$$p = D \times \frac{r}{(r+1)^2} = \frac{Ff}{D} = \frac{F}{r+1} = \frac{rf}{r+1}$$
$$F = p\,(r+1) = \frac{pf}{f-p} = rf = \frac{rD}{r+1}$$
$$f = p \times \frac{(r+1)}{r} = \frac{pF}{F-p} = \frac{D}{r+1} = \frac{F}{r}$$
$$D = p \times \frac{(r+1)^2}{r} = f\,(r+1) = p\left(2 + r + \frac{1}{r}\right)$$
$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$
$$\text{U. S. No.} = \frac{p^2}{16\,a^2}$$
$$x = \frac{f^2}{16\,a^2} = \frac{p^2}{16\,a^2} \times \frac{(r+1)^2}{r^2}$$

N. B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

Note.—In case the above may not be clear to some photographers, the following rules may be better understood:

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground-glass (D); next find the proportion which any dimension in the object bears to the same dimension on the ground-glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply D by r, and divide the product by the square of a number greater by one than r $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known) multiply p by the sum of $r + 1$ and divide the product by r. Or divide D by $r + 1$.

To find the greater conjugate focus (F) multiply p by $r + 1$. Or multiply f by r.

To find D (the distance which the ground-glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F - p$ (the difference between F and p) by p. Or divide p by $f - p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example: Focus an object which is five inches high, so that it is one inch high on the ground-glass; thus we know that $r = 5$. Next measure the distance between the object and the ground-glass (D), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 5\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$D = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5.$ Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5.$

ELSDEN'S TABLE OF POISON AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidotes.
Vegetable Acids....	OXALIC ACID............ including POTASSIUM OXALATE.	1 drachm is the smallest fatal dose known.	Hot burning sensation in throat and stomach; vomiting, cramps, and numbness	Chalk, whiting or magnesia suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies....	AMMONIUM " ...... POTASSIUM " ...... SODIUM "	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts......	MERCURIC CHLORIDE......	3 grains the smallest known fatal dose.	Acid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	ACETATE OF LEAD.........	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	CYANIDE OF POTASSIUM...	*a.* Taken internally, 3 grs. fatal.	Insensibility, slow gasping respiration, dilated pupils and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	BICHROMATE OF POTASSIUM	*a.* Taken internally. *b.* Applied to slight abrasions of the skin.	Irritant pain in stomach and vomiting. Produces troublesome sores and ulcers.	Emetics and magnesia, or chalk.
	NITRATE OF SILVER........		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids........	NITRIC ACID..............	2 drachms have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe, and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk; plaster of the apartment beaten up in water.
	HYDROCHLORIC ACID.......	½ ounce has caused death.		
	SULPHURIC ACID...........	1 drachm has been fatal.		

ACETIC ACID, concentrated, has as powerful an effect as the mineral acids.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidotes.
	IODINE	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrow-root and starch given freely.
	PYROGALLOL...............	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

TELO-PHOTO LENS.

TABLE SHOWING CAMERA EXTENSION NECESSARY FOR VARIOUS SIZES OF PLATES IN CURRENT USE.

Back Focus.	Plate Covered.	6-inch positive and 3-inch negative.		8-inch positive and 4-inch negative.		10-inch positive and 5-inch negative.		12-inch positive and 6-inch negative.	
		Equivalent focus.	Intensity at full aperture.	Equivalent focus.	Intensity at full aperture.	Equivalent focus.	Intensity at full aperture.	Equivalent focus.	Intensity at full aperture.
4¾ inches..	3¼ by 3¼	15½	1/20⅔	17½	1/17½	19½	1/15.6	21½	1/14⅓
5½ " ..	4¼ by 3¼	17	1/22⅔	19	1/19	21	1/16.8	23	1/15⅓
6½ " ..	5 by 4	19	1/25⅓	21	1/21	23	1/18.4	25	1/16⅔
8 " ..	6½ by 4¾	22	1/29⅓	24	1/24	26	1/20.8	28	1/18⅔
10¾ " ..	8½ by 6½	27½	1/36⅔	29½	1/29½	31½	1/25.2	33½	1/22⅓
13 " ..	10 by 8	32	1/42⅔	34	1/34	36	1/28.8	38	1/25⅓
15¾ " ..	12 by 7	37½	1/50	39½	1/39½	41½	1/33.2	43½	1/29
19¼ " ..	15 by 12	44½	1/59⅓	46½	1/46½	48½	1/38.8	50½	1/33⅔
24¼ " ..	18 by 16	54½	1/72⅔	56½	1/56½	58½	1/46.8	60½	1/40⅓
29¼ " ..	22 by 20	64½	1/86	66½	1/66½	68½	1/54.8	70½	1/47
32¾ " ..	25 by 21	71½	1/95⅓	73½	1/73½	75½	1/60.4	77½	1/51⅔
38½ " ..	30 by 24	83	1/110⅔	85	1/85	87	1/69.6	89	1/59⅓
48¼ " ..	34 by 34	102½	1/136⅔	104½	1/104½	106½	1/85.2	108½	1/72⅓

FREEZING MIXTURES.

	Ingredients.	Parts by Weight.	Temperature Produced Starting at 10° C.	Diminution of Temperature.
1	Water	1	—16° C.	26° C.
	Nitrate of ammonia	1		
2	Water	16	—12°	22°
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	—19°	29°
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	5	--	20°
	Chloride of sodium	2		
5	Snow	1	--	45°
	Crystallized chloride of calcium	2		
6	Crystallized sulphate of soda	8	—20°	30°
	Hydrochloric acid	5		

SIZES OF MOUNTS IN COMMON USE.

Minette .... $1\frac{1}{2} \times 2\frac{3}{8}$
Petite .... $1\frac{5}{8} \times 3\frac{1}{8}$
Milieu .... $1\frac{3}{4} \times 4\frac{3}{16}$
Quadra .... $2\frac{1}{2} \times 2\frac{1}{2}$
Carré .... 3×3
Longa .... $2\frac{7}{8} \times 6\frac{1}{2}$
Card .... $2\frac{1}{4} \times 4\frac{1}{8}$

Victoria ... . $3\frac{1}{4} \times 5$
Cabinet .... $4\frac{1}{4} \times 6\frac{1}{2}$
Promenade .... $4\frac{1}{8} \times 7\frac{1}{8}$
Panel .... $4 \times 8\frac{1}{4}$
Boudoir .... $5\frac{1}{4} \times 8\frac{1}{2}$
Imperial .... $6\frac{7}{8} \times 9\frac{7}{8}$
Other sizes expressed in inches.

Size of blotting paper, 19 x 24.

THE LANTERNIST'S READY REFERENCE TABLE.

Distance between Lantern and Screen.	Focus of Lens. 4 in.		5 in.		6 in.		7 in.		8 in.		9 in.		10 in.		11 in.		12 in.		13 in.		14 in.		15 in.	
	Diameter of Disc.																							
	ft.	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*	*ft.*	*in.*
10 feet.........	7	6	6	0	5	0	4	3	3	9	3	4	3	0	2	9	2	6	2	4	2	2	2	0
11 "	8	3	6	7	5	6	4	9	4	2	3	8	3	4	3	0	2	9	2	6	2	4	2	2
12 "	9	0	7	2	6	0	5	2	4	6	4	0	3	7	3	3	3	0	2	9	2	7	2	5
13 "	9	9	7	10	6	6	5	7	4	11	4	4	3	11	3	7	3	3	3	0	2	9	2	7
14 "	10	6	8	5	7	0	6	0	5	3	4	8	4	2	3	10	3	7	3	3	3	0	2	9
15 "	11	3	9	0	7	6	6	5	5	8	5	0	4	6	4	1	3	9	3	6	3	3	3	0
20 "	15	0	12	0	10	0	8	7	7	6	6	8	6	0	5	6	5	0	4	7	4	3	4	0
25 "	18	9	15	0	12	6	10	9	9	4	8	4	7	6	6	10	6	3	5	9	5	4	5	0
30 "	22	6	18	0	15	0	12	10	11	3	10	0	9	0	8	2	7	6	6	11	6	5	6	0
35 "	26	3	21	0	17	6	15	0	13	1	11	8	10	6	9	6	8	9	8	1	7	6	7	0
40 "	30	0	24	0	20	0	17	2	15	0	13	4	12	0	10	10	10	0	9	2	8	6	8	0
45 "	33	9	27	0	22	6	19	3	16	10	15	0	13	6	12	3	11	3	10	4	9	8	9	0
50 "	37	6	30	0	25	0	21	5	18	9	16	8	15	0	13	8	12	6	11	6	10	9	10	0

EXAMPLES.—An 8-inch focus lens, at a distance of 35 feet, will give a disc of 13 feet 1 inch. To produce a disc of 12 feet, with a lens of 10 inches focus, the lantern and screen must be separated by 40 feet. To produce a disc of 15 feet at a distance of 45 feet will require a lens of 9 inches focus.

CONVERSION OF FRENCH INTO ENGLISH MEASURES.

1	cubic centimeter	= 17	minims			
2	cubic centimeters	= 34	"			
3	"	= 51	"			
4	"	= 68	"	or 1 drachm	8 minims.	
5	"	= 85	"	" 1 "	25 "	
6	"	= 102	"	" 1 "	42 "	
7	"	= 119	"	" 1 "	59 "	
8	"	= 136	"	" 2 drachms	16 "	
9	"	= 153	"	" 2 "	33 "	
10	"	= 170	"	" 2 "	50 "	
20	"	= 340	"	" 5 "	40 "	
30	"	= 510	"	" 1 ounce	0 drachm	30 minims.
40	"	= 680	"	" 1 "	3 drachms	20 "
50	"	= 850	"	" 1 "	6 "	10 "
60	"	= 1020	"	" 2 ounces	1 "	0 "
70	"	= 1190	"	" 2 "	3 "	50 "
80	"	= 1360	"	" 2 "	6 "	40 "
90	"	= 1530	"	" 3 "	1 "	30 "
100	"	= 1700	"	" 3 "	4 "	20 "

THE CONVERSION OF FRENCH INTO ENGLISH WEIGHTS.

1	gramme	= $15\frac{2}{5}$	grains.			
2	grammes	= $30\frac{4}{5}$	"			
3	"	= $46\frac{1}{5}$	"			
4	"	= $61\frac{3}{5}$	"	...... or 1	drachm	$1\frac{3}{5}$ grain.
5	"	= 77	"	...... " 1	"	17 grains.
6	"	= $92\frac{2}{5}$	"	...... " 1	"	$32\frac{2}{5}$ "
7	"	= $107\frac{4}{5}$	"	...... " 1	"	$47\frac{4}{5}$ "
8	"	= $123\frac{1}{5}$	"	...... " 2	drachms	$3\frac{1}{5}$ "
9	"	= $138\frac{3}{5}$	"	...... " 2	"	$18\frac{3}{5}$ "
10	"	= 154	"	...... " 2	"	34 "
11	"	= $169\frac{2}{5}$	"	...... " 2	"	$49\frac{2}{5}$ "
12	"	= $184\frac{4}{5}$	"	...... " 3	"	$4\frac{4}{5}$ "
13	"	= $200\frac{1}{5}$	"	...... " 3	"	$20\frac{1}{5}$ "
14	"	= $215\frac{3}{5}$	"	...... " 3	"	$35\frac{3}{5}$ "
15	"	= 231	"	...... " 3	"	51 "
16	"	= $246\frac{2}{5}$	"	...... " 4	"	$6\frac{2}{5}$ "
17	"	= $261\frac{4}{5}$	"	...... " 4	"	$21\frac{4}{5}$ "
18	"	= $277\frac{1}{5}$	"	...... " 4	"	$37\frac{1}{5}$ "
19	"	= $292\frac{3}{5}$	"	...... " 4	"	$52\frac{3}{5}$ "
20	"	= 308	"	...... " 5	"	8 "
30	"	= 462	"	...... " 7	"	42 "
40	"	= 616	"	...... " 10	"	16 "
50	"	= 770	"	...... " 12	"	50 "
60	"	= 924	"	...... " 15	"	24 "
70	"	= 1078	"	...... " 17	"	58 "
80	"	= 1232	"	...... " 20	"	32 "
90	"	= 1386	"	...... " 23	"	6 "
100	"	= 1540	"	...... " 25	"	40 "

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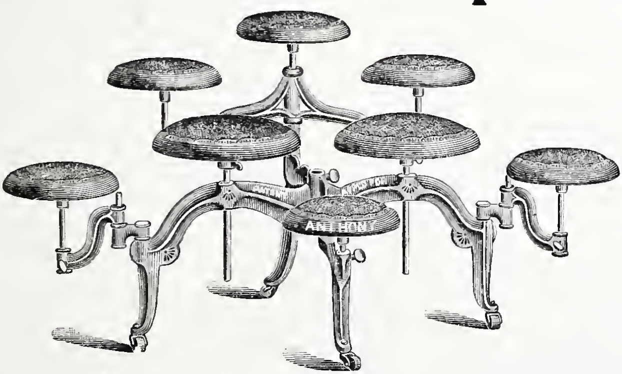

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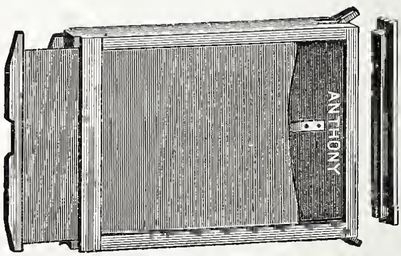

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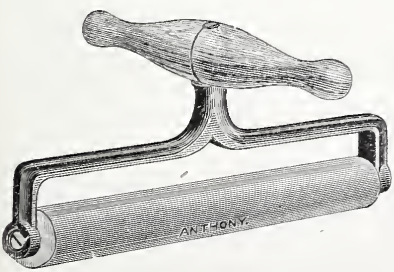

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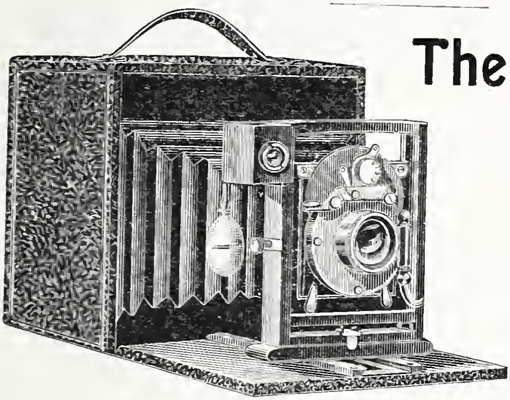

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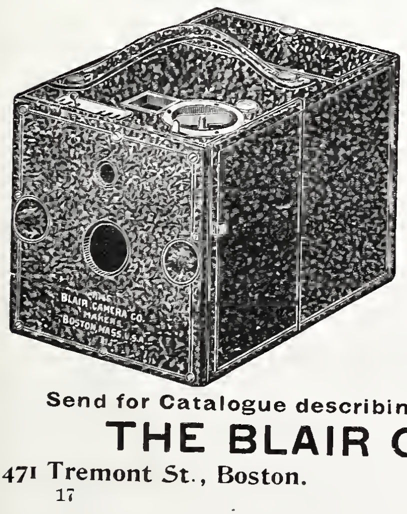

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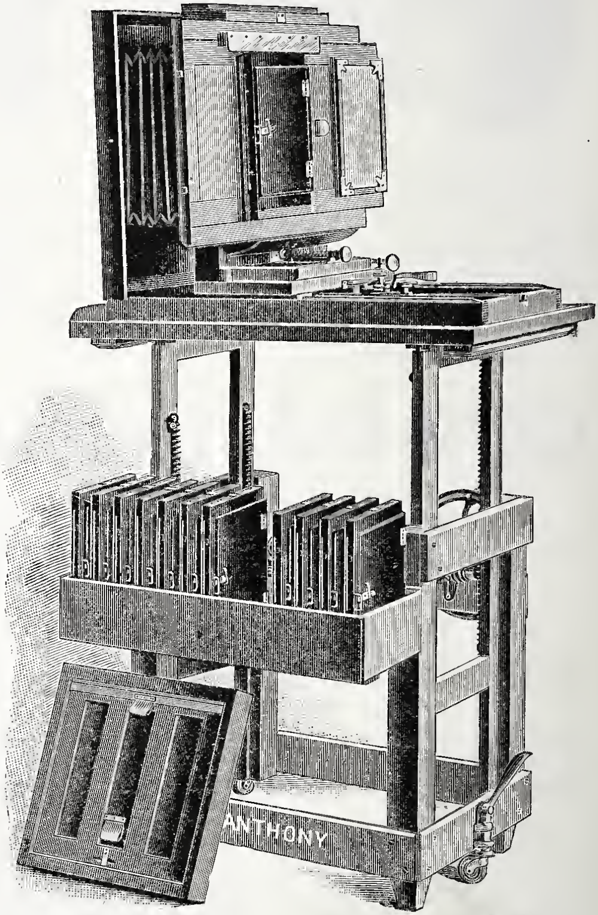

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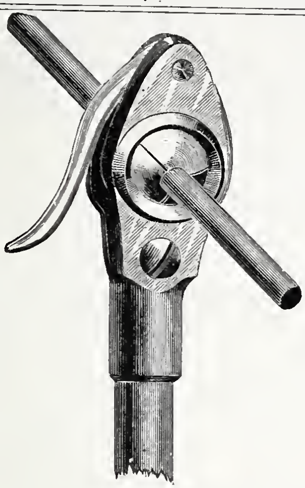

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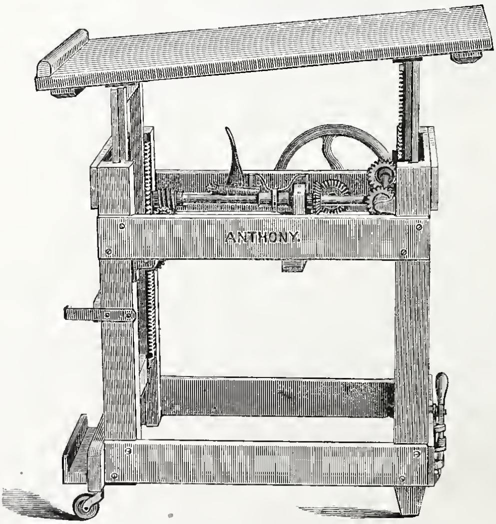

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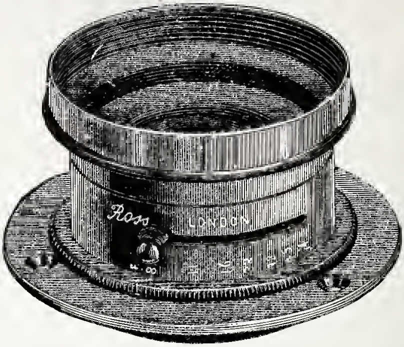

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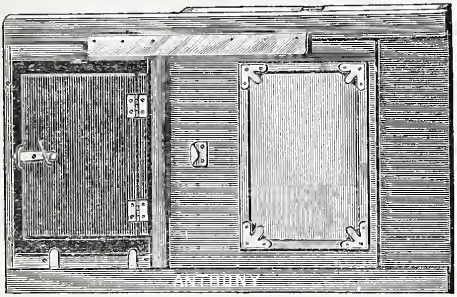

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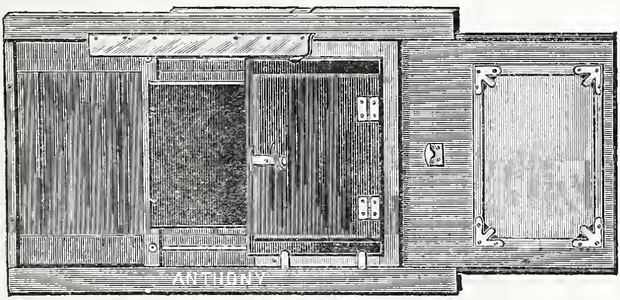

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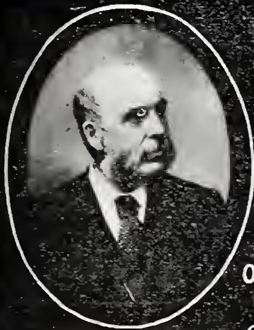

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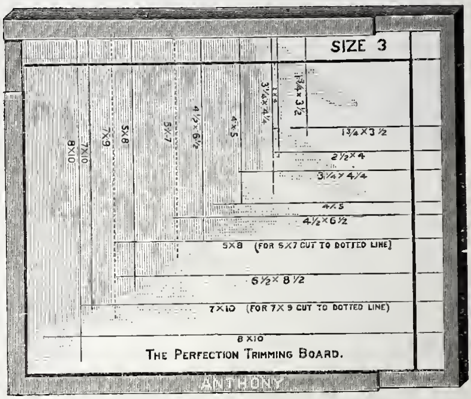

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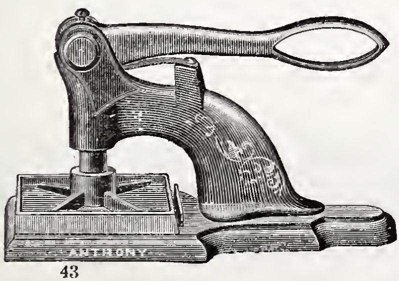

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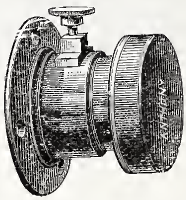

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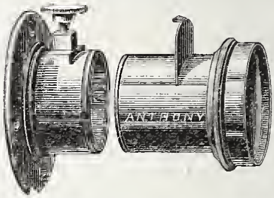

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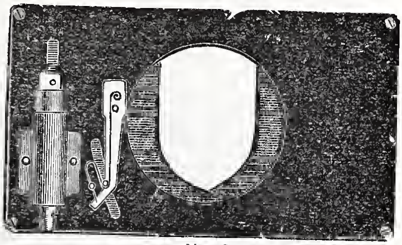

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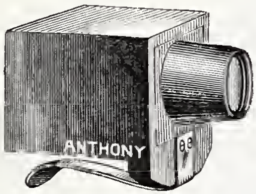
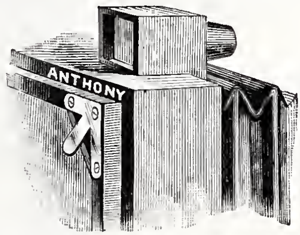


Showing method of fastening Finder to Camera.



Showing Finder on Camera.

This is a neat, compact article that can instantly be attached to any camera, and is of great value in composing a view. The object to be photographed being plainly visible and occupying the same relative position as on the ground glass or plate, it is indispensable for instantaneous views of moving objects. It corresponds in shape to the ordinary negative. The ground side of the glass can be marked at will to denote position desired when taking instantaneous views.

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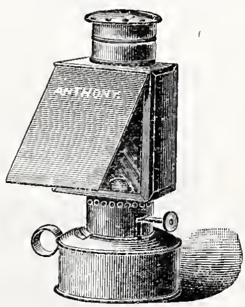

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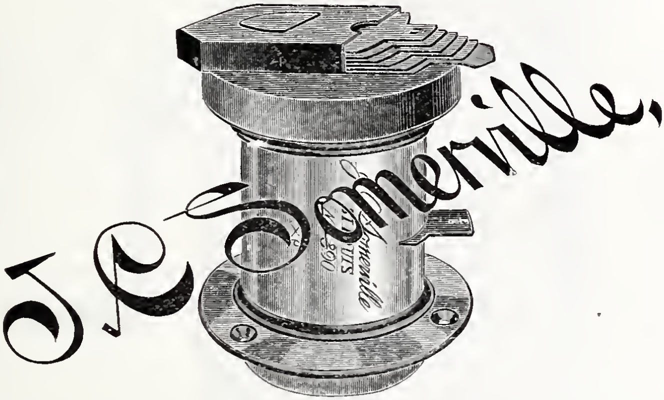

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VIEW LENS.

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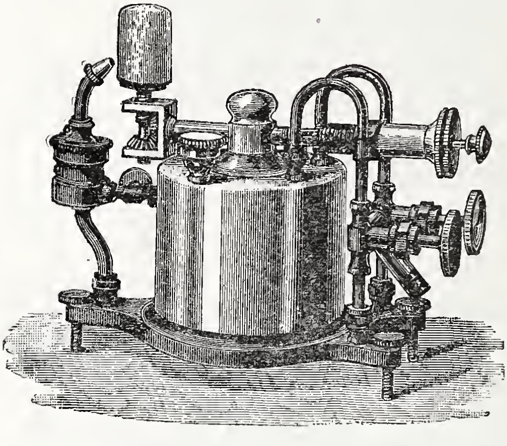
A BOON TO LANTERNISTS.

The Gridiron Saturator.

Made of Best Gun-Metal Castings.

NO SOLDER JOINTS, ALL PARTS ACCURATELY TURNED AND FITTED.



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BEAUTIFULLY FINISHED.

By using the Gridiron Saturator, the lanternist is able to obtain one of the most powerful forms of lime light. The Saturator is silent in action, and less trouble to control than a mixed chamber jet, the gases being regulated to the greatest nicety. There is only one bag or cylinder to attend to and a single piece of rubber tubing, and once the light is centered, it will not move when touching the jet.

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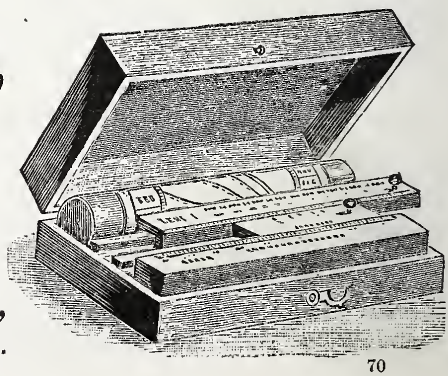

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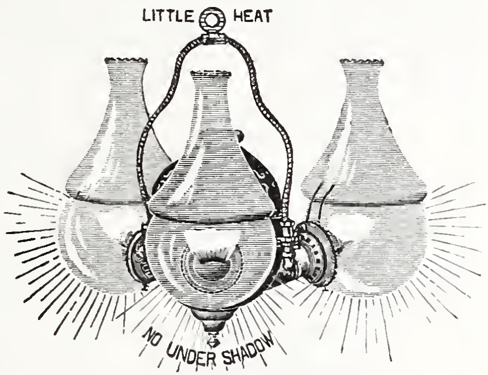

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If my friends when writing for samples would say what they are particularly in search of, whether light or dark interiors, sea views or landscapes, interior or exterior accessories, head and bust grounds, or my admirable half-length and three-quarter grounds in shaded and cloud effects or grounds of the Sir Joshua Reynolds type—it would not keep me from sending a generous line of samples, but their particular wishes would be considered.

No. 1332. OLD ENGLISH WALL AND SEAT.

CONSISTING OF TWO BALUSTRADES, TWO POSTS, TWO WALL PIECES, AND A SEAT.

The following cuts show only a few changes that can be had with this marvelously useful accessory—if a full set of the prints could be seen it would at once recommend itself to every progressive photographer—the price is $28.00 for the complete accessory as shown in cuts one and two, but if the steps are wanted to produce the effect as in cuts three and four, the price is $35.00—unless the customer should prefer the steps instead of the seat, when the former price of $28.00 will obtain.

No. 1.

No. 2.

No. 3.

No. 4.

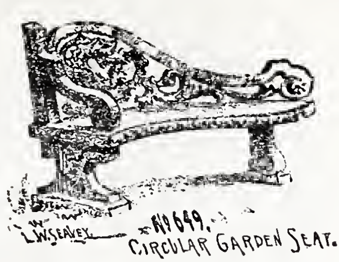
CUSTOMERS NOT WISHING TO PURCHASE THE WHOLE ACCESSORY CAN SELECT PARTS OF SAME AT A LESS COST AS FOLLOWS:

For the Accessory, complete,	$28.00	For the Accessory, without seat,	$20.00
" one-half " with seat,	20.00	" one-half " " "	12.00

For the seat alone, - - - $12.00.

Steps are a thing apart.

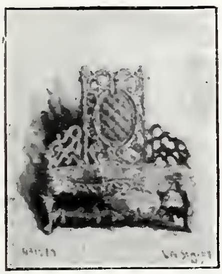
No. 1259.—$20.00.



No. 1260.

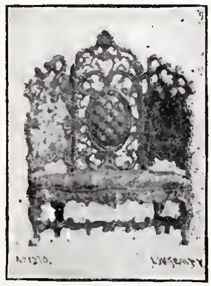
No. 1260.

No. 1260 represents my latest French Screen and Couch—it is one of the most dainty accessories of the Rococo School ever offered—it is susceptible of many changes One of the most useful changes being shown in the above cuts in the raising and lowering of the back. It is intended to use with light and delicate interiors, is covered with furniture tapestry of good weight in a shade of green selected for photography, the frame being finished in pearl colors, very ornamental and exceedingly useful.



No. 1210.

No. 1210.



No. 1210.

No. 1210 represents an adaptation of two of my best accessories and is even more popular than 1260 above referred to; as three cuts are given it is hardly necessary to describe the accessory at length, but I will simply say that it is finished in cream and gold, covered with a French cretonne, which harmonizes with the frame work and is intended for light effects.

I am pleased to refer all photographers in the United Kingdom to my agents:

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